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Original Articles.

INFLUENCE OF OUR PRESENT CIVILIZATION IN
THE PRODUCTION OF NERVOUS AND
MENTAL DISEASES.*

By J. S. JEWELL, M.D.

BY the phrase nervous and mental diseases I mean those affections which have their organic seat in the nervous system, and are manifested by derangements, either in kind or degree, of nervous and mental functions.

Among such affections may be classed all forms of paralysis, however limited or general, however partial or complete, is the loss of power. Under this head it is necessary to remember that the power of the nervous system is not exerted upon the muscles alone, but also upon glands, such as the liver, kidneys, salivary glands, the vast number of gland structures in the skin and the mucous membranes. The power of the nervous system, likewise, is exerted more or less distinctly, no doubt, in or upon the intimate process of nutrition of most parts of the body, and among the rest upon that of the nervous system itself.

Side by side with paralysis should be ranged all classes of excessive morbid muscular action, as in convulsions of

* A Lecture delivered before the Chicago Philosophical Society, December 11, 1880.

all forms and degrees, like epilepsy, catalepsy, all forms of jerkings and tremors, all forms of spasm, with or without unconsciousness, whether permanent or transient. Under this head, also, should be included all those higher affections of motility in which the will is involved, as respects not only its control over the movements of the body, but also over the actions of the mind.

As correlative to disorders of motion, we must include all forms of disorder of sensibility, such as its exaltations, called hyperæsthesias, all diminutions or losses of sensibility, classed under the name of anæsthesias, all modifications or departures from the normal types or qualities of sensibility, gathered under the head of paræsthesias. Not only must we include here the physiological sensibilities, such as those of touch, of the pain sense, the muscular sense, the space sense, the visual sense, hearing, smell, and taste, but disorders of those higher forms of sensibility which pass under the name of emotions.

Finally, not to extend the list too far, the phrase nervous and mental diseases should include all forms of disordered mental action, such as insanity in its different forms, whether there be exaltations or depressions of feeling, or unnatural feeling, or, as sometimes happens, a want of it, and so on. It will thus be seen that the expression I have used is a comprehensive one, much more so than is ordinarily supposed.

My object this evening will be to consider, as far as I can in a discussion limited to so brief a space in time, whether, as a whole, the classes of affections referred to are more common as civilization advances than they were among men in the more primitive stages of the development of society.

This question has been frequently discussed, and widely different conclusions have been reached. Various at-

tempts have been made to determine by the statistics of one period as compared with those of another, whether nervous and mental diseases are more prevalent in high or advanced than in low states of civilization of a people. This would be an unexceptionable mode of proceeding if reliable statistics of the present generation, not to mention past ones, were in existence. But, unfortunately, such statistics do not exist, except within very limited areas, and even in such cases open to serious criticism. I may say that by the use of such a method the conclusion has been arrived at, and maintained as correct, that insanity and nervous diseases are probably no more prevalent at the present day than in the earlier history of nations. I shall, therefore, make no serious endeavor to discuss the question before us in the light afforded by such unreliable data. I shall approach it by a different way.

Without further preliminary I will state my belief, derived from considerable observation and study, that, taken as a whole, nervous and mental diseases are increasing, and must, as things now stand, increase with the advance of civilization.

Civilization has its advantages and its disadvantages, and among the latter is the apparent fact, that forms of disease multiply, and certain diseases become more prevalent with an advance of civilization as it is, rather than in the course of that which is imaginary or ideal.

It may be a discouraging fact, but I am firmly convinced that it is a fact that civilization, as we find it at present or in the past, carries with it the causes or conditions of decay, or even of its final destruction. This has certainly been the history of its particular forms in the past. Without a careful study of its causes and a resolute self-denying application of the remedies, I think it may be considered highly probable that such will, in the course of time, be the inevi-

table fate of our present forms of civilization. Further, I think it may be shown that the nervous system is the part of the organism which is to be the chief theatre of the ruin with which the race at different periods seems likely to be overtaken. But this question is too large for discussion in one evening. Many will not agree with me in my belief that as civilization advances nervous diseases increase, but upon careful study and after a long experience, most would admit as correct the position taken.

I would not have you think I am alone in holding to the belief I have just declared, or that it is novel. Not to spend time in citing authorities, I may be permitted, however, to refer to certain recent statements of one of the highest and most cautious of living authorities on the subject of nervous diseases in all their relations. I now refer to the statements made in a lecture (July, 1880) by Professor W. Erb at Leipsic, in which he declared in the most positive manner the fact—as he considers it to be—of an increase of insanity and nervous diseases.

With these simple declarations, I will proceed to give you some of the reasons for entertaining the belief expressed:

In the first place, among the conditions referred to, I believe the advance of civilization is favorable to an increase of nervous and mental diseases, because such advance necessarily involves a higher degree of specialization and refinement in function, and, hence, in structure than is known to exist in comparatively uncivilized states of the race. No physiological law is more firmly established than the one in which it is declared that a high degree of refinement and complexity in activity in an organ or class of organs implies a high organization. There can be no question as to whether the nervous systems of highly cultivated and refined individuals among civilized peoples are

more complex and refined in structure and delicate in susceptibility and action, at least in their higher parts, than the nervous systems of savages.

This may be an extreme statement of the case, but on that account none the less within the limits of our question.

As civilization advances, the occupations increase, which imply a cultivation of the sensibilities, more especially those comprehended under the sense of beauty. A relatively large number of persons give themselves to the study and practice of art in its various forms,—to polite literature, to sedentary occupations, and the like. The more a part of the nervous system is used the more extended its development. In highly civilized communities, there is a constant tendency to a loss of balance in nerve development, in which the *sensitive* side of the nervous system preponderates over the motor part of the same. All disturbances of symmetry or balance in development tend toward disease. This is one disadvantage of a high civilization, as compared with one which is lower and in which the nervous system is less sensitive, and, in consequence, there is a narrower range of feeling, whether for pleasure or pain, and, at the same time, less intensity as well as less range of sensibility.

This state, which involves an increasing loss of balance between sensibility and power in the nervous systems of highly civilized peoples, is a grave matter. It is not a diseased state, but verges in that direction. Under such circumstances, pleasures, and, *pari passu*, pains, are widened and intensified. This state of things certainly belongs to an advanced and an advancing civilization, and involves a world of minor consequences, both for the weal and the woe of a people.

But to proceed: There are two principal ways in which

the nervous system may be diseased ; that is, by overdoing by any unhealthy kind or degree of exercise of the nervous system in physical and mental occupations, and by overexcitation in which there is an unhealthy play of emotion, or of some form of feeling, whether low or high. Now, it will be my purpose to show by certain examples selected almost at random, that an advanced, as compared with a primitive civilization, leads to overdoing and to overexcitation in a remarkable degree, and that in these ways nerve and mental diseases are increased. Then, to begin, let us consider what the effects in the aggregate are, of those occupations which call for prolonged and severe exercise of the nervous system, such, for example, as is seen in the workings of our public-school system in this country, especially in the Northern States.

It will certainly not be pretended that as many persons out of a thousand, taken at random, attended school fifty or one hundred years ago in this country as now do out of a thousand persons equally taken at random. It is probably a fact that out of the same number in population at the present day, as compared with the condition of things fifty or one hundred years ago, three persons at present to one at the earlier periods mentioned attended schools of some sort. It will not be disputed, either, but that the courses of study are longer and the range of subjects greater at present than they were even fifty years ago in this country.

The graded system in our schools represents essentially the average of practicable attainment within stated periods as fixed by experience. Many could easily rise above a grade in the allotted period ; still others, with rather close application, can maintain themselves at the level of their grades ; while a very considerable number reach the required level only by systematically overdoing ; while a few others finally

break down in nerve health by the way, and are hence obliged to abandon their course of study.

It is my opinion that a very great number of cases of nerve disease are produced, such as cerebral congestions, undue nerve irritability, sleeplessness, or, at least, imperfect sleep troubled by dreams, headache, various forms of neur-æsthenia, not to speak of graver forms of disorder, by systematically overtaxing children in our public schools. This opinion is the result of very considerable observation and experience.

It must necessarily happen that a great many children among the vast number in annual attendance upon the public schools in this country have very moderate abilities for learning, or are affected by hereditary weakness of constitution in various ways, so that in the rather close race to keep up with their more fortunate fellows, they suffer in health.

This I believe to be a more serious matter than is commonly supposed. It is one to which the attention of parents, school inspectors, boards of education, teachers and physicians should be directed with great emphasis.

I have seen in the course of my observation many children who, with the best of intentions on the part of parents, had been forced along in their studies with great damage to health. The school year includes something like nine months out of the twelve, and in many instances the hours in-doors are long. During this great period, five days out of each week, children, during the age in which confinement is borne with difficulty, are kept too often in ill ventilated or imperfectly warmed rooms, with restraint upon their all but spontaneous activities, and at the same time are more or less busily engaged in brain work ; and this is maintained in many communities during several years of the restless, growing, plastic period in the

life of the individual. It is the period in which physical exercise in the open air is simply a necessity, and almost a passion.

I cannot but think such long periods of repression of physical activity at an age when there is a strong spontaneous tendency toward it, and such long confinement so often in imperfectly heated and poorly ventilated rooms, while, at the same time, the brain is taxed in various directions—I say, I cannot but think in this direction lie the causes of a vast number of general nervous affections.

Then, the fixed use of the eyes at a tender age leads frequently to ill consequences, partly by exhausting and rendering irritable the visual nerve apparatus, producing asthenopia and other disorders. These affections are frequently overlooked or disregarded by those who have the care of children, and with disastrous consequences. It often happens that children have various disorders of vision, such as defective accommodation, giving rise to short sight or long sight, or they have indistinct vision from the deformity called astigmatism, or they have unusual strain upon the muscles of the globe of the eye which are used to produce accurate convergence of the axis of vision upon the small objects looked at. Such conditions lead to pain in the eyes, frontal and other headaches, cerebral congestions, and a variety of slighter disorders which, as a rule, pass unobserved or are disregarded until a case becomes alarming.

I have many times seen cases that had been running for years, in which signal defects of vision existed, making it almost a cruelty to keep a child at study, its complaints being unrecognized or disregarded while it is driven to school.

It is not uncommon for children, either of their own motion or as compelled by their parents or guardians, to study

of evenings until the brain becomes excited, its circulation disturbed, and the result very frequently is restless and unrefreshing sleep, headaches, and, sooner or later, more or less marked exhaustion and nervousness in various degrees and ways. Statements of the same tenor might be multiplied, and are susceptible of practical demonstration.

Now, it will scarcely be pretended by any one that in the earlier periods of civilization in our own country, relatively so great a number of persons were engaged in study, or that the courses of study were so prolonged and elaborate as we now know to be true. Within fifty or one hundred years whole sciences have been created. Knowledge has been extended in a surprising manner in almost all directions, and courses of study are now, as a rule, very much longer, embrace a greater variety of subjects than was true in earlier times, and the mind of the student is taxed as never before.

I do not hesitate, therefore, to say that from this source alone certain forms of nervous disease, notably those of the brain, are relatively much increased in the present advanced, as compared with a more primitive condition of civilization. The causes of brain disease in this case are multiplied, and hence such diseases are increased.

If what has been alleged against the courses pursued in the common schools, as furnishing causes for nervous diseases, is true, how much more true are similar statements when applied to our higher institutions of learning, from the ordinary seminary up into our universities, where almost every possible means for exciting the student forward in the race for an education is brought to bear. Courses of study are laid down which tax to the utmost even the brighter and healthier students of a class, and in which mediocre students, whether in mental or physical health, find it difficult or impossible to maintain themselves with

credit. This is to be seen in professional schools as well as in those devoted to the broader work of a general education. It requires from three to seven years of severe effort to accomplish the courses laid down in most of our higher institutions of learning.

Bad as the results are upon a large minority of those who try to complete the courses of instruction in our higher institutions of learning, they become worse in some special cases.

A vast number of young ladies, for example, at these times, as compared with the same number of fifty or one hundred years ago, are engaged at in-door rather than out-door occupations. From six or seven to twelve or thirteen years of age, they are in our common schools. Subsequently, at a peculiarly susceptible period in life, they are sent into seminaries, boarding-schools, schools of music, embroidery, painting, or to the colleges, until they arrive at a period in life from seventeen to twenty. In many instances these girls are sent away from home, and live more or less irregularly in the matters of diet, exercise, sleep, and study. Most of them are engaged too exclusively in those forms of study or action which cultivate the sensibilities rather than enlarge and fix the powers of the nervous system. All this happens, as already said, at an unusually sensitive and plastic period in life, whether for the male or female, but especially so for the latter, and the result is, in an astonishing number of instances, that they either break down before they get through, or get through broken in health and more or less unfitted for any useful occupation, either for years or for life.

The more delicate in physical health is the boy or the girl, the more is it thought to be a duty on the part of parents or guardians to keep them in school. It is thought they are unable to work their way in any physical or manual

employment. They are physically weak or exhausted, or born of consumptive or sickly parents, and they must be and they are educated. While the mind is becoming in some measure trained, too often in useless directions, the physical organization is being gradually worn until at last there is little left but a physical wreck, or, if not so bad as this, impaired physical health for years or for life, as might have been plainly foreseen. Many times I have observed a young man or a young woman deliberately started on an educational career, because possessed of an active mind, though joined to a feeble body, only to complete an education, as it is called, immediately to die or to enter upon a life of invalidism. Unhappily this is no fancy picture.

It is a fearful responsibility, so often ignorantly and thoughtlessly assumed by parents and guardians, and blindly permitted by teachers, by which a young person is deliberately placed upon what might have been foreseen as a career straight to physical destruction.

The time is coming, I hope, when these matters will be more intelligently and practically considered than they have ever been. When it shall come to pass that a student will not be examined simply to find out whether he or she knows so much arithmetic, or grammar, or geography, or history, but side by side with this as practically the more important, whether he or she has a healthy organization, has a healthy nervous system, has a large or a small chest, has a healthy digestive system, has any important hereditary bias or tendencies.

In hundreds of instances have I seen, during the later periods of student life in our higher schools, general nervous exhaustion, brain exhaustion, melancholia, hysteria, vascular irregularities, cerebral congestions, headaches, insomnias, neuralgias, tremors, and the like, the direct results of over-study.

It will hardly be pretended that such causes for nervous diseases are more prevalent in a low as compared with an advanced civilization.

Again, as civilization advances, professions multiply which involve life-long brain activity. In these the standards of attainment are more elevated, and the conditions of success become gradually more difficult to fulfil, with the progress of civilization.

In the clerical, legal and medical professions, a relatively increasing number of persons is found, who, in consequence of the operation of various motives in the fierce race for supremacy and professional rewards, are exhausted or overcome. They work too many hours, become more or less irregular as to the times of taking food, maintain for unusual periods high states of brain activity, have produced gradually, sometimes suddenly, cerebral congestions, unrefreshing sleep, or sleeplessness, impaired digestion, headaches, and besides these a variety of other more or less pronounced nervous and mental disorders, differing in various cases, a large proportion of which are traceable to overwork and other incidents belonging to professional life as we see it.

The same remarks may be made in relation to the literary, but more particularly the journalistic profession.

The most intense nervous and mental strain is maintained in these days, as never before, in the conduct of great daily newspapers. But few persons unacquainted with the facts of this case are aware of the intense and continuous labor the conduct of these enterprises involves. Every faculty is on the alert in watching the course of events, in collecting and condensing not only items of news, but in watching and exposing to the reader the less palpable, though not less real tides of thought and feeling in civil, political, commercial, monetary, ecclesiastical, and other affairs, at home

and throughout the world. The wonderful extension of the telegraph, which places the whole civilized world more or less distinctly under the eyes of the leading workers upon our great newspapers, implies, in the present advanced state of civilization, a breadth, intensity, and rapidity of nerve and mental action such as the conductors of newspapers in the olden times were strangers to.

Side by side with the workers in these exhausting occupations must be placed that very large and ever-increasing company of men engaged in conducting large commercial and financial concerns. Besides the almost numberless details which must daily pass under the review of chiefs of concerns where hundreds of thousands and millions of dollars are involved, a wider sweep of objects or of relations must be made. The markets must be watched with almost feverish anxiety. A critical and tactful study must be made of the wants of customers, or of sections of country, or of the probable future demands in trade. Then, again, in consequence of the vast extension of the credit system, a sleepless eye must be kept on the financial standing of widely distant customers. Nice perceptions must be had in which there is an element of uncertainty or hazard, and upon decisions in relation to which purchases are made or declined which may involve success or ruin. Rival firms at home and abroad must be closely watched, and, in general, everything must be done that can be done by tireless industry, nice calculation, combined with close attention to details down to their finest ramifications. When all these things are taken into the account, it is not to be wondered at that men become worn, haggard, nervous, irritable, sleepless, and finally broken in nerve health.

These forms of occupation multiply and widen as civilization advances. Any one whose position is such as to call him to see the results to which such nervous and mental

strains lead, gains the firm conviction that in these ways nervous and mental diseases are increasing.

In the next place, I would call your attention to another fact, more conspicuous at present, especially in this country, than ever before, and to which, within my certain knowledge, a vast number of cases of nervous and mental disease may be traced.

It is, perhaps, not so much what people do as what they endure or suffer that leads to nervous and mental diseases. The ceaseless pressure of weighty responsibilities and the consuming fire of cares and anxieties, which can not be laid aside as physical or mental labor may be, often tell more disastrously upon the nervous organization than any overwork.

Under this head, from among the many striking examples that might be cited, I wish to direct attention to the following: In these days, more than ever before, there has entered into almost every legitimate branch of commerce a purely artificial element of risk or hazard.

It is speculation. Even so tame and legitimate an occupation as that of buying and selling grain has been permeated, almost obscured, by the speculative spirit. It has penetrated, like a deadly miasm, almost every possible line of trade. It has even appeared, in one form or another, in the house of God.

Trade in all natural productions of the earth, such as grains, meats, tissues, fabrics, of all forms of mining properties, real estate in all forms of corporate property, stocks, bonds, everything near and far, from the greatest to the least, from the least to the greatest,—all have been permeated by this unhallowed and dangerous spirit of speculation, which thrives only upon the spoils of the fortunes or the savings of untold thousands.

A large volume of the business done in our boards of trade

and at the exchanges is speculative. Mr. A. sells one hundred thousand bushels of wheat to Mr. B., to be delivered at a time agreed upon in the future. Mr. A. does not own a single grain of wheat, never did and probably never will have the means wherewith to buy a hundred thousand bushels of wheat. Mr. B. is aware of all this, does not expect to receive the wheat, although he has bought it, and would be surprised and alarmed if it were actually delivered. What is really done is that each man deposits a certain sum of money at some bank or with some broker, which sums of money pass under the name of "margins." This is a fair outline of all speculative transactions, no matter what the commodity is, from a bushel of grain down to a raffle for some object at a church fair.

But no sooner are the "margins put up" than each man begins, as a rule, to be more or less anxious as to the outcome three months hence. In nine chances out of ten one of the parties must lose his money; that is, the other party takes the money without giving anything whatever as a consideration in return; he simply pockets it.

This speculative mania is having in these later years an extraordinary increase. It has extended, at last, not only to almost every line of business, but to all ranks, and both sexes in society. It is not indulged simply by the trained operators who are the possessors of millions, who sit at the centres of business and manipulate the markets, swelling their ill-gotten gains upon the little contributions of thousands of the "small fry," but it has extended so as to involve a vast array of persons of small means, such as clerks on small salaries, and other persons of very limited means. This is not confined to cities, but has extended gradually to the remotest villages in the land. These furnish their pittances, here

and there a few dollars, to some broker or other party conducting the operation in the distant city.

Tens of thousands of persons in these United States invest a certain proportion or all their means in these hazardous operations. No sooner is the speculation embarked in than the individual becomes nervous, anxious night and day, until the result is made known, and then almost in nine cases out of ten his anxiety is exchanged for the distressing certainty that the money invested has been swallowed up out of sight forever.

A man may do a hard day's work and be greatly fatigued at night. After eating a full meal he may then lie down in peace and recuperate by the morrow. But not so with the anxious speculator. The individual too frequently cannot withdraw his mind long at a time from the illegitimate business upon which he has entered. He becomes preoccupied, inattentive to other employments or interests, and often becomes so nervous or excitable, especially if possessed of a nervous temperament, as to make a resort to stimulants and sedatives an apparent necessity. Unlike the man, tired from legitimate work, who can sleep, he has no sooner laid down than he begins to think, stimulated by his hopes or fears about what will be the result of his uncertain business. What will he do if he succeeds? What will he do if he fails? He watches the course of the markets in the line in which he is engaged. According to the natural constitution or temperament of the individual will he be more or less anxious or disturbed.

Now, in the advance of civilization, in our own country at least, nothing is plainer than that the speculative phase of business has relatively increased many fold, and is still increasing. I am in a position to know that a large number of cases, of especially the slighter forms of nervous and mental disease, arise from the wear and tear of the brain in

following this dangerous and unhealthy form of so-called business. What the end is to be it is difficult, perhaps impossible, to say.

In the next place, I would call your attention to what I look upon as an exceedingly important topic in the present discussion, that is, the increasing use, as civilization advances, at least in this country, of certain stimulants and sedatives. I cannot now delay to discuss the causes of the alleged increase in the use of such agents. I shall content myself, for the present, with asserting that such an increase is a fact.

Under this head, I would direct attention especially to an increase in the use of coffee and tea.

In the earlier history of this country, unless in the larger cities and towns, comparatively little of these stimulants was used. But at present, owing to their extraordinary cheapness and the facilities which exist for distributing these as well as other commodities, their use has extended to almost every family in the land.

Coffee and tea are, taken altogether, the purest nerve stimulants known. They are not tonics in any sense of the word. The infusions of these agents contain no nutritive material worthy of a moment's consideration. They do, however, contain a certain alkaloid, and perhaps other ingredients, which act directly upon the nervous system.

A nerve tonic is an agent the proper action of which is to quicken and perfect those intimate nutritive processes upon which the growth and repair of the nervous system depend. A nerve stimulant acts very differently. It acts upon the nerve structure so as to quicken the play of its own proper activities. It hastens the expenditure of nerve force, and hence quickens the waste of nerve substance. Nerve action becomes quicker, feeling becomes more acute, the play of emotion more vivid, the celerity of

thought is greater, but the power of the nervous system, especially the power for control, is not augmented, but rather diminished.

Back of these phenomena the circulation of blood in the brain is quickened; nerve cells and nerve fibres attenuate or wear away faster; soon the effervescent play of nerve activity subsides, and there results a period of comparative exhaustion, marked by loss of power, increased reflex excitability, especially in respect to the heart. There is increased nerve irritability, and exaltations in acuteness of the pain sense. If the dose of the stimulant has been rather large, the ill results just enumerated become quite marked. The tongue becomes coated; the appetite for the first meal in the day is almost gone; dyspeptic symptoms are apt to appear; sleep is, in a measure, unrefreshing, and feelings of exhaustion or depression are experienced in the morning. Headaches, and slight or at times severe neuralgic symptoms are likely to appear, especially of mornings, and to continue during the day, unless the individual takes his ordinary dose of coffee infusion.

It is customary to hear an expression like this: "I would rather go without everything else at breakfast than my cup of coffee. If I do not take it, I feel out of sorts the entire day. But with it, even if I take nothing else, I can work along contentedly until dinner. Take anything else away, but do not take away my coffee."

As the result of long observation and of personal experience, I am ready to declare that I know of no other way in which moderate harm to the nervous system is done to the same extent as by the use and abuse of coffee and tea. An immense number of cases of moderate digestive disorder, of the slighter trigeminal neuralgias, headaches, unrefreshing sleep, palpitations of the heart, irritability, moderate nervous exhaustions, moderate nervous depres-

sions, or the "blues," are met with, caused by the abuse of these stimulants.

I am aware that many persons hold to a different opinion, but my own opinions have not been adopted hastily. I have been giving this subject special attention for years past, and can, if necessary, produce hundreds of cases in which various nervous disorders have been found directly traceable to the source now indicated. An emphatic warning needs to be given on this subject, as one of interest to nearly every person throughout our land.

In this connection I should be glad to speak of the influence of certain sedatives, especially of tobacco, but time will not permit. I cannot, however, pass without referring to the enormous increase in the use, both in medical practice and out of it, of pain-allaying and sleep-producing agents, of opium and its salts, and the hydrate of chloral.

These agents have not only become serious causes of nervous and mental disease, but their use is partly a consequence of nervous and mental disease. The increase in their use implies an increase of those nervous disorders to the palliation of which they are applicable.

Side by side with the agents already mentioned should be placed that most gigantic of all evils of its class, affecting high as well as low conditions of civilization.

I mean the abuse of alcohol. It is probable that its use is permeating more and more widely the various ranks of society. Its forms are multiplied; the means for disseminating them are becoming more perfect as the years pass, and with an increase of wealth, and in the perfection and refinement of civilized society, the incentives and occasions for their use are increased. I know of no more patent source of the graver forms of nervous and mental disease. I have omitted its discussion, partly because it has been more thoroughly held up before the public by temperance

workers and in the movements for temperance reform, than the other subjects to which I have alluded.

But, take it as a whole, I think it cannot be successfully disputed that, in the ways just described, nervous and mental diseases not only are produced but increased with the advance of civilization.

I would next turn to another aspect of our subject of high importance ; that is, the progressive specialization and refinement of labor. This is one of the special marks of an advanced civilization as compared with one that is primitive.

For example, it is only a few years since the discovery of the telegraph. It has now extended in the most surprising manner into almost every phase of active life. The mental state of attention on the part of the telegrapher is tense and wearying when it is long kept up, especially in offices where a large amount of business is done. Then, in the transmission of dispatches, there is a rapid, peculiar, and monotonous movement of the right hand and arm, especially in the case of the expert transmitter. The special nerve apparatus which stands between the mind, whatever that may be, and the muscles which are put in action, becomes highly developed, or specialized, so as to act almost automatically. In the pursuit of this occupation, it is not at all uncommon to find persons with exhaustion of the special nerve apparatus allotted to the right arm, and the results are very frequently subacute inflammatory affections of the nerves or muscles, spasmodic affections, such as telegrapher's cramp, tremors, and paralysis.

These disorders, in most instances, are plainly seen to grow out of a pursuit of the occupation, and are limited to the special parts used. In the advance of civilization such occupations multiply on every hand.

Under this head I wish to speak of a matter of much

practical importance. I now have in mind piano practice by the young, especially by girls of a tender age. In these days this accomplishment has been carried to an extraordinary degree of complexity and perfection. Years of the most persistent effort are given to the acquirement of "styles of fingering." The most elaborate "studies" are invented with the design of training the nervo-muscular mechanism to the point of the automatic production of every possible, and, I was about to say, impossible movement the hand can execute. To become moderately expert requires daily from one to four hours of continuous fatiguing practice for years. The pupil must sit upright on a stool, and use both arms, and all the fingers, the muscles of the upper members, the nerves which go to them, the nerve cells in the spinal cord, out from which the nerves go, and finally, above these, a limited part of the brain. When the practice is overdone, as it so often is, the arms become fatigued, the upper part of the spine tired, tender and painful. There is pain in the back of the neck and up into the base of the brain, and various other slight nervous disorders caused by protracted overuse of certain parts. This matter has gone to an irrational and harmful extent, and deserves a vigorous rebuke. Children are often cruelly driven to these exercises.

Take the matter of type-setting, using the pen, and many other occupations. These lead in very many instances to overuse, particularly of the right arm, giving us scrivener's and type-setter's paralysis.

In the great manufacturing interests of the country, and in the specialization of labor within their limits, persons are now employed to perform some limited and special task, to the exclusion of all other kinds of work, to an extent never before known. In this way, in almost all forms of labor, persons overuse, so as to lead to disorder or even to seri-

ous disease, particular parts of the nervous system. As civilization advances, there is reason for supposing that this work of specialization of labor within more and more restricted areas will go on to a degree not attained at present.

In these ways, then, does an advanced civilization, as compared with a lower condition of the same, lead to a relative increase in nervous and mental affections.

Finally, to terminate the present discussion of this aspect of our subject, it may be remarked that the forms and customs of highly civilized society, by which night is turned into day and day into night, in which there are parties, late suppers, highly seasoned food, irregular eating, too much excitement, numberless ill results of social friction, such as jealousies, envies, and disappointments, in which there are inordinate machinations and struggles to attain and maintain position in a highly artificial and unnatural form of society,—all these things tell in a thousand ways on nerve and mental health. But I can not tarry to speak of them to-night.

Now, as a proof of the correctness of the assertion, that highly developed and specialized nervous systems are more liable to disease than those of a simpler and less specialized structure and action, I would refer to the curious fact that the lower animals seldom are affected by manifest nervous diseases, and are almost never insane, as compared with highly civilized men. The chief reason for this difference seems to lie in certain differences in nerve organization. That condition of things which makes the wide differences in liability to nerve and mental disease between men and the lower animals, it would seem probable, holds good, for the same reasons, as between the savage and the highly cultivated individual belonging to a high state of civilization. This statement receives some support from the fact that in-

sanity, at least, is far less common in children than in adults. This fact is to be explained by a consideration of the differences in structure, development, and action of the nervous system of children as compared with that of adults. The child has a more primitive brain and represents, to some degree, that state of brain characteristic of individuals belonging to a low state of civilization, when compared with that of the highly cultivated adult brain.

But I have no time at present in which to discuss these suggestive topics. I can only allude to them.

Finally, I would direct attention to one other probable cause of the increase of nervous and mental diseases, which lies by the side, rather than in the direct line, of my subject this evening; I refer now to the part played by heredity. I can not enter into a recital and discussion of particular facts, however interesting such a course would be. It has been done at length by various writers, especially by Dr. Prosper Lucas in his great work, in two volumes, on "Natural Heredity."

But it may be remarked in general terms that whatever is acquired, whether in health or disease, in the way of developments or accidents in the nervous system, is liable to be perpetuated in a measure by hereditary transmission from one generation to that which comes after. It must necessarily happen that many persons born of healthy parents will in various ways acquire disease which, when acquired, is often transmitted in some form or other to their offspring. This is one of the most important and infallible modes of an increase of nervous and mental diseases. The stream widens as it advances. It begins in one and may spread to many, if it spreads at all.

A vast number of instructive facts and considerations based upon them could be placed before you under this head. To their discussion an evening might profitably be

devoted. You all know that insanity, or the insane temperament, may be and is transmitted. The same may be said of epilepsy, neuralgia, migraine, tendencies to paralysis, chorea, idiocy, criminal tendencies, nervous weakness, and besides these many other morbid conditions or species. If it shall be learned, after due inquiry, that the causes of nervous and mental diseases are more prevalent in our own country to-day than they were fifty or one hundred years ago, then the question is settled that heredity plays an important part in an increase of such disorders.

This is a subject destined hereafter to occupy much more serious public and private attention than ever before in the history of the world. The time, let us hope, is not far distant when marriage may be in some way regulated so as to prevent what should be foreseen,—that is, that the union of two persons in marriage, with certain known or easily discoverable hereditary tendencies, will be the means of bringing into existence insane, or physically feeble and worthless, or morbidly nervous, or criminally inclined offspring. The time is coming when this subject, delicate and unmanageable as it is, will be carefully pondered by parents, or by those who are to become such. This is one way in which, under certain circumstances, nervous and mental diseases may be and are increased.

These are a few of the considerations which have led me to the conclusion expressed at the beginning of my paper, namely, that as civilization advances, nervous and mental diseases increase.

INSANE DELUSIONS: THEIR MECHANISM AND THEIR DIAGNOSTIC BEARING.

By EDWARD C. SPITZKA, M.D.

TO probably no other class of symptoms of mental derangement does so much interest, and interest of so manifold a character, attach, as to the delusions of the insane.

These perversions of the apperceptual and conceptional sphere have, indeed, had the high medico-legal importance assigned to them (I need not add, erroneously) of constituting the criterion of insanity, and from the days of Willis, Haslam and Esquirol down, practical alienists have based many important indications for the prognosis and treatment of mental diseases on the special character of the delusions accompanying them.

Notwithstanding the admitted importance of these symptoms, none of the classical writers on insanity have attempted to range all the various forms of insane delusion side by side before the student's eye, to analyze their bases comparatively, and to formulate their differential diagnostic significance. Certain special forms of insane delusion, and certain other conceptional disturbances which are allied thereto, have been well studied by continental alienists, but the entire field has not been gone over with that precision and that unity of plan which the student of the subject requires.

In my opinion, there is no evidence of insanity which constitutes as proper a starting-point for study as the insane delusion. On first sight, the most complex of insane symptoms, it is yet that manifestation which strikes the mind of the novice with greatest force. It is the symptom to which the readiest expression is given by the patient himself, the one which can be most readily laid bare before a class in the course of clinical demonstration, and the one which offers to the beginner in psychiatry that obvious contrast with sanity, which is the most satisfactory as it is the most tangible to his mind. For the very reason that insane delusions are, however erroneously, considered by the laity as the criterion of insanity, they should constitute the introduction to the study of insanity. The lay conception of a lung disorder associates it with cough and expectoration; now while cough and expectoration do not constitute criteria of lung affections, yet the clinical teacher who will analyze these phenomena before the new-comer, and point out their true meaning previous to proceeding to the physical signs, whose recognition and interpretation require experience and acumen, does that new-comer a far greater service than he who endeavors to override the untutored mind by ignoring all which the latter has hitherto been cognizant of, and presenting at once those abstractions which the beginner is altogether unfitted to comprehend! For like reasons is it to be considered unfortunate that some modern text-books and teachers open the subject of insanity with an abstract analysis of the variations in the intensity of the mental processes, which, while they are perhaps more constantly found in the insane than insane delusions, are far less evident, nay, at first even unrecognizable, to the novice. My individual experience has taught me that nothing serves to initiate the student so rapidly in the mysteries of the insane mind, as an analysis of the in-

sane delusion, for perversions of the conceptional faculties are far more readily understood than those involving the moral, emotional and volitional states.

In the present paper, I shall first detail the principal kinds of delusion encountered among the insane, irrespective of the form of insanity with which they are found. Next, I shall proceed to analyze the morbid psychological character of the insane delusion and its mode of origin. Finally, I shall endeavor to point out the diagnostic inferences which can be drawn from the character of insane delusions *per se*.

§ 1. At the outset, the question arises: How shall insane delusions be classified? In many treatises we find them divided according to their accidental character, as to whether they are expansive or depressive, and the fundamental distinction has thence been made of expansive and depressive delusions. The further subdivisions have been added, of ambitious, religious and erotic delusions under the former, and of hypochondriacal delusions and delusions of persecution under the latter head.²

All these terms are admissible as terms, but the principle of classification which adopts them as fundamental distinctions is faulty. A parietic may entertain the delusion that he is a king, so may a monomaniac, and so may an imbecile or dement, but nowhere does an old German saying "*Wenn Zwei Dasselbe thun, so ist es darum nicht Dasselbe*," apply so well as here. In the three cases mentioned, although the conclusion of the delusion is formally the same, yet its logical foundation and structure is in all a widely different one. To study that difference is to analyze the actual character of the insanity with which the delusion is found, and right here it is to be insisted that the formal contents of delusions are of but a secondary importance, as compared with their method of origin and building up.

§ 2. Delusions may be divided into the GENUINE and the SPURIOUS. The former group consists of those delusions which have been the creation of the patient himself; the latter consists of those which have been adopted from other sources. The former have an intrinsic importance, and characterize the form of insanity with which they are found; the latter have only a collateral significance, due to their differential diagnostic relations.

§ 3. The genuine delusions of the insane are to be classified according to their synthesis. We find that certain delusions are of a complex logical organization, and that others are devoid of such an organization. The first differentiation will therefore be that of SYSTEMATIZED DELUSIONS as contrasted with UNSYSTEMATIZED DELUSIONS.

§ 4. All the various forms of insane delusions, hitherto admitted, may fall under both of these heads, that is, we may have delusions of persecution which are systematized and such which are unsystematized, and the same applies to delusions of grandeur and to hypochondriacal delusions. It will therefore be desirable in describing a given case, and in order to fully characterize the delusions present, to speak of a "systematized delusion of persecution" or an "unsystematized delusion of grandeur," etc.

To answer the question whether a delusion is systematized or unsystematized, is of vastly greater importance than to determine its accidental features, if I may so term them. Take a delusion of persecution, for example. If it is *systematized* we may be absolutely certain that we have to deal with a case of that primary "partial" insanity, for which, in default of any other admissible English term, I have recently³ proposed the reestablishment of the term "Monomania." If, on the other hand, it is *unsystematized*, we know with equal certainty, that it is a symptom of melancholia, of senile insanity, or of the first stage of progress-

ive paresis. Thus this mode of inquiry gives the delusion itself a diagnostic weight which, under the older view, it could not possess.

§ 5. The SYSTEMATIZED EXPANSIVE DELUSION is the one which has had most attention directed to it. It is the prominent symptom of that form of primary partial insanity which the French designate "*Megalomanie*." I shall, however, endeavor to show that the expansive delusion is not sufficiently distinct from other systematized delusions to justify the ranking of the mental affection with which it is found under a separate name. The more modern French writers divide "*Megalomanie*" into the simple, the religious and the erotic form.⁴ The German writers⁵ speak of monomania with expansive delusions, and its two sub-groups of religious and erotic monomania. (*Primaere Verruecktheit mit Groessenwahn, Religioese Verruecktheit, Erotische Verruecktheit.*)

In all these divisions, the special direction in which the delusion has developed has given the name to the forms of insanity enumerated.

It may be readily imagined that if the world were atheistical and had been so for several centuries, and every trace of religion had been obliterated from the human mind, that the insane developing systematic delusions of grandeur, would not develop that form which we term religious. To use the additional adjectives *religious*, *erotic*, etc., in the nomenclature of the expansive systematized delusions, is, therefore, merely done for convenience' sake, and does not presuppose an essential character of the delusion.

§ 6. When we proceed a little later on to analyze the mechanism of the three principal varieties of expansive systematized delusions, we shall find that they indicate each of them a certain grade of logical enfeeblement, and that the enfeeblement is the more pronounced as we leave

those delusions which involve mundane relations and proceed to those involving sexual and religious matters.

§ 7. The highest general mental development among constitutional lunatics is found with those who cherish *systematized delusions of social ambition*. These patients are the kings, emperors, social reformers, inventors of flying machines, the *perpetuum mobile*, great poets, military geniuses, etc., of asylums. The delusion frequently has grown out from a dream, or from an actual hallucination. The patient acts consistently with his assumed character, and in most instances the existence of a certain grade of mental energy and ability is documented by the formation of projects which, whatever their ultimate feasibility, are undertaken with some attention to detail and to the patient's worldly circumstances. More frequently, I find, has the idea of grandeur gradually developed from a delusion of persecution, and it is not rare to find the original delusion of persecution and the resulting delusion of grandeur existing side by side.

Often, especially with patients of high culture, are the delusions not so monstrous as to lead to an error in the patient's sense of identity, but limited to his self-esteem in the abstract. He writes doggerel or mediocre verse, for example, and imagines himself as great a poet as Byron, or he invents some unimportant mechanical contrivance, and lays claim to the gratitude of a nation or a king.

§ 8. *Systematized delusions of an expansive erotic character* have given the name to the so-called "Erotomania." In the text-book of Bucknill and Tuke, this term is used as synonymous with nymphomania, which is calculated to lead to a serious confounding of two widely different forms of derangement. As Krafft-Ebing⁶ and the modern French authors correctly remark, the perversion in erotic delusional insanity is not necessarily accompanied by sex-

ual desire, and it is to be added that nymphomania is not generally accompanied by those delusions which are termed erotic. Here the word erotic is used in its higher and strictly classical sense.

The patient, noted in his adolescence for his romantic tendencies, constructs an ideal of the other sex in one of his day-dreams, and on some occasion or other discovers the incorporation of his ideal in an actual personage, usually in a more exalted social station than his own. He or she then spins out a perfect romance with the adored person for its subject, and according as the surrounding circumstances may be momentarily favorable or not, delusions of self-exaltation or of persecution may be added to the erotic one,

§ 9. *Systematized delusions of an expansive religious character* are rooted in a devotional tendency of the patient, and brought to their full bloom by incidental circumstances either actual or in the shape of hallucinations. It is not uncommon to hear such patients designated as cases of religious melancholia, for supposing themselves assailed by inimical and diabolical forces they become depressed, and even refuse food. But to call an individual who, aside from these actions (all consistent with his or her delusions), believes himself to be God, Christ, a saint, the Messiah, a religious reformer, or herself the Virgin Mary, and who, the very next day, passes into visionary or ecstatic states, a melancholiac, is to involve one's self in a profound contradiction with the established use of psychiatric terms!

§ 10. SYSTEMATIZED DELUSIONS OF A DEPRESSIVE CHARACTER have also long attracted the attention of alienists. Unfortunately Esquirol⁶ failed to perceive their great analogy to the systematized expansive delusions, and placed the cases of insanity in which the former were prominent symptoms under his group of lypemania. Other French

writers discovered a relation, and hence the term "monomanie triste" in contradistinction to the "monomanie gaie," or that in which expansive delusions predominate. But none perceived the true relation as distinctly as Marcé,⁷ whose remarks* on this head have not received that attention which they merit. I therefore seize the present opportunity to do justice to one of the greatest thinkers in the field of psychological medicine, and who, unnoticed by the alienists of his own land, evolved those principles which, a few years later, were independently announced by Snell, Kahlbaum and Sander, and which are destined to universal acceptance.

Speaking of the term lypemania, as employed by Esquirol, he objects to its use and to the principle of classification that is associated with its use. He divides the patients classed by Esquirol as lypemaniacs into two entirely distinct groups, namely, melancholia proper, and monomania with depressive delusions (*monomanie triste*). The latter division corresponds in every detail of Marcé's description to the "Primære Verruecktheit mit Wahnideen depressiven Inhaltes" of the Germans, just as the former corresponds to the true melancholias of Krafft-Ebing, Meynert and Schuele.

Our author continues: "In sad monomania the patient will exhibit fixed ideas of a melancholic nature, but he will, while regulating his actions by his delusive conceptions, yet be able to pay attention to the actual affairs of life, while in melancholia, on the contrary, the delusion invades the whole intellectual field and leads to a state of depression, to inertia and to stupor."

§ 11. Under the head of the depressive systematized delusion, we shall find the antithesis of almost every form found under the head of the expansive delusion. We have

* Quoted from Dagonet⁴.

systematized delusions of depressed social ambition, of worthlessness, of moral monstrosity, or of criminality ; again we have such of a *depressive erotic character*, usually persecutory, while the list is completed by *depressive religious delusions* of the most varied kind. How very circumstantial the line of demarcation between the expansive and depressive delusion really is, must be apparent from the fact that a systematized depressive religious, erotic or personal delusion, may within a few days (yes, I know of one instance where this occurred within a few hours) become expansive. In fact, as I have already hinted, expansive and depressive conceptions often exist side by side as component elements of the same delusion.

From this it will be evident that a subdivision of the systematized delusion must necessarily be arbitrary. When, therefore, I proceed to describe later on the salient features of some more common forms of delusion, I shall not devote much attention to that incidental circumstance, their depressive or expansive character.

§ 12. When we see an individual without any manifest disturbance of his emotional and effective states, in full possession of the memories accumulated in the receptive sphere, and able to carry out most or all of the duties incident to his social position, who cherishes such a gross error as a delusion, firmly believing in the reality of that which, from his education and surroundings, we should expect him to recognize as absurd, we are naturally puzzled to account for the phenomenon, and numerous have been the theories advanced to explain the systematized delusion. The older view that a delusion is based on an exaggerated excitation of certain cell groups in the cortex⁸, must be abandoned, for such excitation could not be so distributed anatomically as to involve the cell groups which, in the light of our modern theories of cerebration, are involved in

any one special set of intellectual functions without involving so much of the cortex as would lead to generally exaggerated mental action. Excitation beyond the normal bounds does sometimes occur in these patients, but such excitation partakes of the character of a delirium, has no fixed relation to the systematized delusion, and is episodic.

§ 13. Instead of an exaggerated cell action, we shall find that actually a contrary state of things is at the root of the systematized delusions. The only explanation of these creations, which is in accord with anatomical, physiological, and, I think I may add, pathological principles, is that of Meynert.⁹ This writer had, many years ago¹⁰, called attention to the presumptive physiological rôle of certain arched fibres which are known to unite adjoining as well as distant cortical areas with each other. He claims that if we are justified in asserting a nerve bundle, which unites a peripheral surface like the retina to the cortex, to be a tract of functional projection, another tract which unites two cortical areas must be looked upon as an associating mechanism. I have since then ascertained that as we examine an ascending series of animal brains, culminating with the human, the white centre of Vieussens, which in the reptilia and marsupials is almost exclusively devoted to "projection," grows with far greater rapidity than the cortical area and cortical thickness and richness in cells.¹¹ This increase is largely and mainly due to the increased number and extent of the associating tracts. In fact, I should, if asked to point to the chief factor on which the higher powers of the human brain depend, lay less stress on the cortical development, as such, than on the immense preponderance of the white substance due to the massive associating tracts.* Although the projecting tracts are also

* If transverse vertical sections be made of a monkey's and a human brain, the chief contrast noticeable is afforded by the more than double massiveness, proportionately, of the white centre of Vieussens in the latter.

larger in man than in any other animal, yet so great is the preponderance of the associating mechanism that the elimination of the former would not reduce the white substance of the hemisphere by one-half of its bulk. Both projecting¹² and associating fibre masses increase in a nearly geometrical progression as we pass from the lower animals to man; but the ratio of progression of the associating fibre masses exceeds that of the projecting tracts.

There are certain convolutions, which are almost exclusively connected with *fibræ arcuatæ*, that is, with associating tracts, and which enjoy but little direct connection with the bodily periphery.* It is reasonable to suppose that the cortical areas so connected play an important rôle as a substratum of the abstractions. Like a polyp, such an area sends out its arms, the associating fasciculi, to those gyri which have received the simpler registrations transmitted by the projecting tracts, seizes them and utilizes them in the construction of its organic unity (to use a perhaps rather coarse simile).

§ 14. Such cortical areas and their subsidiary associating tracts, bound into the still higher unity of the entire hemisphere, constitute the substratum of the metaphysician's *Ego*.

A disturbance of the intricate anatomical relations which are involved in the material basis of the *Ego*, must be accompanied by a disturbance of the *Ego*, or may even render an *Ego* an impossibility.

It is on the accurate connection of projection areas with projection areas, and of these with the "abstraction" areas, and of these again with each other, that the faculty of logical correlation, which after all is the keystone of the metaphysical arch, must be supposed to depend. The correction

* Broadbent, I believe, has expressed the view that there are gyri which have no peripheral connections. The correctness of this has not yet been demonstrated.

of the countless errors which a person naturally commits in a lifetime is possible only by the influence, analogous to the inhibitory, exercised by the associating fasciculi, and the proper aim of every healthy educational system is to develop this control of the various cortical "screen" fields on each other, a correction which, with progressing maturity, is delegated to the "abstraction" fields.

Quite confirmatory of these presumptions, is the fact that we so frequently discover aberrations in the development of the gyri, in the proportion of the cerebral lobes to each other, and in the symmetry of the hemispheres, on examining the brains of those constitutional lunatics with whom the systematized delusions are found.*

Both the anatomico-pathological theory, as well as metaphysical analysis, lead us, then, to the result that the insane systematized delusion is not the result of exaggerated cell action, but is due to defective association, in other words, to a weakness of the logical inhibitory power.⁹

§ 15. The component elements of the systematized delusion are the same which constitute normal conceptions; such as the day-dreams, or the errors of every-day life. But, as Meynert happily remarks, the systematized delusion differs from the same error, which it resembles in some respects, by the utter incapacity of the logical apparatus for the time being to correct the delusion by the same process which enables the sane individual to recognize that his error is an error.

* This applies also to the moral, the constitutional affective, the impulsive, and other organically insane subjects. This view was first announced by myself in the W. and S. Tuke Prize Essay, and provisionally published in a review appearing in this JOURNAL, 1873. Since then, it has been advanced by Schuele in his Handbook, and is credited to that author by v. Krafft. I lay stress on the priority of the views announced, as I cannot be expected to quote Schuele as the author of a theory which is original with myself, and which is the outgrowth of the principles promulgated by Th. Meynert, in his lectures delivered at the University of Vienna, 1874-75. The first observations on cortical malformation with the insane of this class as well as certain imbeciles, were made by Jensen¹³ in 1875, and on these Schuele seems to have based his views. One of the finest cases in point is that of Muhr.¹⁴

Much of the difficulty involved in a thorough appreciation of the systematized delusion, can be obviated by regarding the systematized delusional lunatic as a member of a large family, whose other members are the subjects of various forms of hereditary degenerative insanity.³ Actually his insanity reduces itself to a partial imbecility. The mental weakness does not involve the entire horizon as in the imbecile or idiot, but only certain of the higher combinations. It is not even necessary that all these higher combinations be impossible, nay, some of these may be so perfect that by a collateral process of reasoning, such lunatics may correct their delusions.*

§ 16. The one fundamental character which distinguishes the delusions of systematic delusional lunatics is the correlation with their surroundings, or of their individual physical states. However falsely the patient's sensations and external circumstances may be interpreted, yet, after all, there is a *pseudo* logical chain running from them to the delusion which they help to create and to sustain. This is absent in the case of patients exhibiting unsystematized delusions.

Up to a certain stage, the systematized delusion is analogous to a healthy conception; this is never the case in an unsystematized delusion. It would be difficult to draw the line between the delusion of Martin Luther that the devil was persecuting him, based on a hallucination of vision and never corrected by him, on the one hand, and that of a religious monomaniac who believes himself referred to by the Pope as the coming Saviour, based likewise on a hallucination of vision. In fact, there is no other discrimination to be made than that the delusion of Martin Luther was in full consonance with the belief of his day,

* Thus the *dictum* that "an insane delusion is a delusion out of which the subject can not be reasoned," falls to the ground, unless the words "for the time being" be added.

while the delusion of the religious monomaniac of to-day is in conflict with that which from his education and the time in which he lives, he should recognize as rational and possible. Nothing could better illustrate the great analogy existing between the conceptions possible in health and the systematized delusions of the insane, than this instance. Imagine the religious monomaniac living in the sixteenth century, and entertaining the delusion that the devil was interfering with a task on which he was engaged, having appeared to him in person (hallucinated)! In no court of law could his insanity be maintained on the strength of that one, or even a number of such delusions!

As examples of the manner in which the subjects of systematized delusions utilize casual occurrences in the construction and defence of their delusions, I need but refer to the common case where such patients detect a connection between their delusive hopes or fears and an advertisement or a bill-poster containing their initials. That others sustain their royal birth by a fancied resemblance in their features to some member of the royal family. That another appears at Washington to be inaugurated as President of the United States, because he was born in the same town and was brought up in the same circumstances and had the same opportunities as the President-elect. That another bases a memorial to the Lord-Chancellor of England, claiming a great estate as his own, on the fact that his niece is married to some relative of the legatee.

A lady whom I treated recently, from one of the British colonies, had built up an elaborate series of delusions culminating in the general conclusion that everything about her was changed—even her husband, who had from an Englishman become a Spaniard (because he was of a dark complexion), on the single fact that the nursery-maids of her family and a neighboring one had played with her in-

fant and another's, and must have got them mixed up, because, when a few days after, she looked at her child's eyes, the irides were of a different color than when it was new-born. This observation was no doubt correct, for it was corroborated, but the inference that her child was changed was faulty, as its grandmother had observed it from day to day; had noticed the change in color to be more decided than is usual, and the child suffering cholera infantum, changing greatly in appearance otherwise; but she was able to prove its identity by a number of circumstances which would have convinced a sane person. My patient, however, went on, interpreted the arguments of her relatives to a desire on their part to make the best of what could not be remedied, and became satisfied that her husband was indifferent to his family. A few attentions shown by him to some young ladies convinced her of his infidelity, and ready to believe anything of him that was bad, a few robberies occurring in the neighborhood were also attributed to him, as he happened to come home late on the evenings when they took place, and one night she found a large negro peering over the garden wall, at whom the watch-dog, recognizing the alleged accomplice of her husband, did not bark. Her parents, removing her to their own home, previous to taking her to New York for medical advice, she here found that a cousin changed her wardrobe, and abstracted articles therefrom, because a half dozen packages of chemises contained only four such. On landing at New York she advanced similar charges against the custom-house officers.

§ 17. In how striking a contrast with the imbecility of judgment involved in the existence of such delusions is the mental calibre of these patients in other respects? The chronic presidential candidate, Platt, was a fair and logical orator and had sound views on many points of political

economy, though the sport of sophomores when I saw him. The claimant of the estates of Lord Camperdown was a skilful surgeon and a popular dentist, familiar with the researches of Magendie, and occupying and maintaining a position at the English court for many years; a man who, after the actual outbreak of his disease, imposed himself on Cavaignac as a general, and losing his practice as a surgeon and dentist, and after organizing a riot in Australia, earned a support as a newspaper correspondent. The lady, part of whose history I detailed above, had qualities which would have made her an ornament of what is called "society," and neither society nor the alienist would have detected the first evidence of her insanity unless attention had been thereto directed by the few relatives initiated in her secret.

§ 18. The absurdity of the delusion is not so much a test of the absolute mental rank of the patient as is its synthesis. A very absurd conclusion may be reached by a very elaborate ratiocination, and a less absurd conclusion be reached by a very crude process of reasoning. It is in studying this aspect of the subject that we become convinced of the close relation of insane projects and insane systematized delusions. Elaborate projects, some of them actually feasible, are evolved by these insane, along with very absurd delusions, while the more stupid class of these lunatics either evolve no projects, or very stupid ones, along with their delusive conceptions.

§ 19. The factors engaged in producing the systematized delusion are two-fold. One, the predisposition we have recognized as presumably based upon an anomaly of the cerebral architecture, the other or exciting causes we shall now proceed to study.

1. The general mental tone of the patient. If he be of a sanguine disposition, the delusion is often the outgrowth

of a day-dream, on the plan of the saying, that the wish is father to the thought. If he be of a suspicious turn, delusions of persecution are apt to arise.

2. The physical state. If this is fair, delusions are apt to be expansive, and to involve social and sexual matters. If somatic disease exists, the disordered condition of the viscera will give rise to visceral illusions with consequent delusions of a hypochondriacal tinge.

3. The circumstances of the patient. The age in which he lives, the education he receives, his social condition,—all these seriously modify the character of the delusions of this class of the insane.

While the factors enumerated under these three heads are of considerable importance, it must be insisted here that they all in combination will rarely create a systematized delusion, unless the cerebral predisposition exists. Even in the few cases¹⁵ where systematized delusions were observed, in subjects devoid of a hereditary or acquired taint, the presence of some autochthonous aberration is not excluded. The fact that the delusions do not appear in early life, as a rule, is to be explained on the very simple basis, that the mind requires a given time to collect the conceptions which even insane ideas require as their building material. This observation constitutes an important guide to treatment. It shows us that after all the best treatment of these cases is preventive, that the object of the education of these subjects ought to be to counteract the vicious tendencies implanted in the cerebral organization. Their treatment, therefore, necessarily must be educational. Every day we hear of gastric catarrh, constipation, dysmenorrhœa and other ills, assigned as the cause of hypochondriacal and erotic delusional insanity. The constipation is removed, the dysmenorrhœa relieved, but the delusion persists unmodified. One might just as well ex-

tirpate the ribs,* or cut off the hæmatomatous ear of a parietic, with the hope of influencing his disease thereby.

§ 20. THE UNSYSTEMATIZED DELUSION is characteristic of the acuter insanities. They may be ranged in two great groups: those due to actual destruction of logical associating power, and those due to the overwhelming of the mental sphere by a powerful emotional or other disturbance. The delusions of grandeur, of progressive paresis are types of the first class; the delusions of persecution in the acute melancholiac and epileptic are types of the second class.

§ 21. In the former case, the patient says he is a king or a president, or has a million dollars, because it is a desirable thing to have these positions and moneys. But he can not tell you how he can be a king and yet be named Dennis Maginnis. He can not tell you how it is that he had twice as much yesterday as he has to-day. He never acts in that strict accordance with his assumed character which one suffering from systematized delusions of grandeur does. A systematic delusional lunatic, if claiming great personal attractions (which is rare), will demonstrate the claim by letters received, by poems which he will state refer to him, and by the fact that certain people have looked at him in a peculiar way and have made comments on him. The parietic, however, will simply boast that he is good looking, and it is not always impossible to prove that his statements are not based upon a deep conviction, but are mere braggadocio.¹⁶

A systematic hypochondriacal lunatic will argue that his body is indestructible, and complain that he is condemned to live forever, and he will explain to you that his idea must be correct, because with the physical ailments from which

* At no very remote period, it may be confidently predicted, oöphorectomy will cost a couple of lives before it will dawn upon enthusiasts that erotic monomania is not located in the ovaries.

he is suffering, and which are incompatible with life in ordinary people, it must be evident that he cannot die.* The parietic, who is sometimes hypochondriacal in the first stage of his disease, has occlusion of the rectum to-day, rocks in his head to-morrow, a clockwork in his chest the day after. In short, the unsystematized hypochondriacal delusion, like the unsystematized delusion of grandeur, is lacking in that consistency and that elaborate constitution characteristic of the corresponding systematized delusion.

A parietic tells me that he is five thousand three hundred and seventy-two feet high, his actual height being rather under five feet. I place him side-by-side with a man of six feet and ask him how high he is; he correctly answers about six feet. I ask him whether he has to look up or down to tax that man's height; he answers without hesitation that he has to look up. On my now interpellating him as to his inconsistency, he simply repeats in a random way, that he is six thousand feet higher than any other man. Such inconsistencies are not found with systematized delusions. Another parietic claims that he is General Grant. The week before he claimed that he was Rothschild, but abandoned that idea when told that the great Rothschild was dead. He is unable to say when the war began, what his business was before he became General, what battles he fought in, and, finally, what country he is president of. A systematized delusion would have incorporated all these facts.

§ 22. There are also unsystematized delusions of persecution, of subjective worthlessness and criminality. These are found in melancholia (true lypemania, acute melancholia).

Here the emotional state has overwhelmed the entire intelligence, and thrown the logical faculties into the back-

* The legend of the Wandering Jew is based upon the statements of such lunatics (Ahasuer, etc.).

ground. The patient believes he is bad because he feels unworthy in a general way; because he is bad he has committed the unpardonable sin, and cannot tell you, when nor why, nor what the unpardonable sin is. Or he is despised, he is hated because despised, he is pursued because hated, and whispers from all sides drive him to seek relief from a danger which was never clear in his own mind, by suicide.

Here again there is found the great demarcation between the systematized and the unsystematized delusion. In the systematized delusion, such partial logical power and such other mental qualities as the patient *ever had* are utilized by him in the construction and defence of his delusion, and what is of great medico-legal importance, also utilized in the carrying out of his schemes of defence, of revenge* or of suicide (which is rare here). The melancholiac, however, is deprived of such logical power as he naturally possesses for the time being; aside from his hallucinations he is unable to specify any support for his morbid idea, and his actions betray that same lack of system which his delusions do, except in the case of the suicidal attempts; where the latter are the direct result of the delusions, they are as unsystematized as these.

§ 23. Very transient unsystematized delusions of grandeur crop out occasionally with violent cases of acute mania,†

* An example of this kind is furnished by the incendiary of the St. Peter's Asylum.

† The first case of puerperal mania I saw in the Vienna Asylum, exemplified this better than any case I have since seen. Isolated on account of her violence, the patient tore every shred of clothing from her body, and then in an incredibly short space of time picked the matting to pieces, and made from the strands a most perfect and tasteful dress, including every article of wearing apparel from the hat and shoes to a satchel. This she wore for a long period; I believe her abandonment of it was the first sign of recovery. She claimed to be a princess; asked which one, she mentioned a name not in the list of Austrian princesses, and she repudiated the attentions of a secondary chronic maniac who, claiming to be the empress, acted the part of her mother. Later on she accepted the relation, but the manner in which she did it, was evidence of her insincerity. It was evidently entered into with the same spirit that children will enter into assumed relations toward each other, in play, not with that earnestness characteristic of systematic delusions.

but they partake of the same flightiness and confusion that is characteristic of all the intellectual acts of the violent acute maniac. Delusions of conspiracy and persecution sometimes occur with senile insanity, but the constructive element so prominent in systematized delusions of persecution, and that consistency of action found with the latter are conspicuously absent. The defence of the morbid idea is not as skilful.

§ 24. On the whole, then, we are justified in saying that the fundamental criterion of the insane delusion from psychological and pathological points of view, is its organization, and that this organization reflects, to a certain degree, the form of insanity of which it is a symptom.

A systematized delusion, no matter whether it be one of grandeur, of persecution or hypochondriacal, means a bad prognosis, chronicity, and leads us to look for a hereditary or other taint. I may say here that with the delusion of personal ambition that correction of the delusion which alone holds forth a hope of recovery is most possible, that the chances are next most favorable with the delusion of persecution, less favorable with the religious and hypochondriacal, and null, I think, with the erotic variety.

An unsystematized delusion of persecution, means either acute melancholia, senile insanity, the first stage of progressive paresis (rarely) or alcoholism. The narrower diagnosis between these three states is not difficult. It may be well to note the frequency with which delusions of marital infidelity and of poisoning occur with alcoholic subjects. The delusions here stand by themselves, are never circumstantially supported, and are probably not unrelated to the effect of the alcoholic poison on the sexual and gustatory apparatus.

An unsystematized delusion of grandeur is the characteristic feature of progressive paresis, and found in all

the other paralytic insanities.* It rarely occurs, and then very vaguely expressed and undefended, in violent mania.

In addition, all kinds of unsystematized delusions are found in chronic secondary mania, as relics of the primary insanity which preceded it. They resemble fragments in the chaos which represents the ruins of the intellectual structure; they are disconnected, stupidly expressed, and differ from the delusions of progressive paresis by their slighter variability, and lesser expansiveness when expansive.

§ 25. In asylums and in prisons, we not infrequently discover subjects of imbecility or of otherwise stunted mental growth, who display insane delusions. These, from the mental grade of the patients, it might be anticipated, are of the simplest character. They occupy that relation to the systematized delusion, which the notions of an ignorant navvy bear to the conceptions of a sage. The *Ego* of these patients is so feebly pronounced, that it is difficult to determine whether they have identified themselves with their delusional character in the same sense that the subjects of systematized delusions have. While, therefore, I am not able to say that the delusions of these imbeciles should be classed as systematized, I would be very unwilling to put them in a category with the unsystematized delusions.

The patients with whom they are found appertain to the hereditary and degenerative group, and the delusions have an analogous relation, signification and mechanism, as far as we can speak of a mechanism, as in these other hereditary degenerative states with which the elaborate systematized delusions are found. The importance of these con-

* Non-paralytic dementia after meningitis, syphilis, etc., sometimes manifests these delusions.

ditions which are not infrequently discovered in company with imperative conceptions and impulses, and sometimes with epileptiform states, is chiefly medico-legal. As my friend Dr. Hazard will, within a short period, lay his observations on a pertinent case, that of the executed homicide Redemeier, before the profession, and as I wish in that connection to make a special report on a similar subject, the homicide Munzberger, in whose case the judge recognized the insanity from the bench, I will defer the consideration of these states for the present.

As the subject of spurious delusions has been ably discussed in the last number of this JOURNAL¹⁷ it will not be necessary to go over that subject here, especially as, like other subsidiary themes, it could not be adequately discussed otherwise than in a separate paper.

My main object was to show the grave significance of the systematized delusion, leaving it to the reader to draw such deductions as may suggest themselves in reference to the *rationale* of driving out delusions from the ovaries, uterus and rectum when they are rooted in the brain structure, and the justifiability of classing every patient with expansive delusions, as an acute or chronic maniac, and one with depressive delusions as an acute or chronic melancholiac, to which classification, with the exception of the recent importation of paralytic dementia, our asylum nomenclature has been limited thus far.

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ON SOME POINTS IN REGARD TO COLOR- BLINDNESS.

By H. M. BANNISTER, M. D.

THE practical questions connected with color-blindness have been brought very prominently before the public within the past two years, and have been acted upon by state legislatures and the general government as well as by various private corporations. The necessity of distinguishing signals correctly is of such obvious importance in railway operating and in navigation that it is no wonder that the subject has attracted public attention. It is more a matter of surprise that the practical importance of an infirmity that has been recognized for a hundred years or more, and that has been studied more or less by physiologists for half that period, and the common occurrence of which has been well known, should not have been earlier recognized. Men had been sailing ships and running locomotives many years under the present systems of colored signals, and their capacity had never been questioned until, under the present tests, they were found defective and disqualified. It cannot, nevertheless, be assumed from this that the present agitation of the subject is needless; it may be that only one-tenth of one per cent. of accidents by rail or sea has, amongst its causal factors, this defect of color-vision, and yet the public has the right to claim protection against even this remote possibility of danger. The ques-

tion only remains as to just what is necessary for this protection and how it is to be afforded. If color-blindness of certain kinds and degrees does not disqualify the individual from correctly distinguishing signals, as is claimed by Mr. William Pole,* then the practical importance of the defect is greatly diminished, if not altogether destroyed, as regards these occupations. Again, if this infirmity is curable by exercise or education, as is held to be the case by Dr. Favre, who was himself one of the first to call attention to the practical points involved, then the whole subject is deserving of far less importance than is nowadays attributed to it. If either of these views is correct, it is a reasonable presumption that a person in constant exercise of his perceptive powers on the distinction of colored signals would be able to overcome or compensate for this particular defect, so far as all practical purposes are concerned, while still, it may be, exhibiting it in the plainest manner to the usual tests. Some facts point very strongly in this direction; the recent examinations of pilots and engineers have revealed cases of color-blindness where it was utterly unsuspected, and in persons who had acceptably filled positions for many years that required daily and almost hourly exercise and test of their ability to correctly distinguish colored signals.

The object of this paper is to discuss certain practical points in relation to color-blindness that appear to have been heretofore too little noticed. First among these is what I may call the psychic element in the disease or defect, which, I think, is quite an important one in many cases. The seat of color-blindness has been commonly spoken of as in the retina or conducting-fibres to the brain, and many writers have apparently acted entirely on this assumption. The usual way of stating the Young-Helmholtz

* *Contemporary Review*, May, 1880.

theory of color-perception is that there are three sets of nerve fibres, conveying respectively impressions of red, green, and violet, or that there are three sets of retinal perceptive elements with such functions. The Hering theory is commonly stated as if there were three kinds of physiologico-chemical changes taking place in the retina, and producing, according to their stage and degree, the shades and tints of black and white, blue and yellow, and red and green. Nerve fibres cannot be considered, in the light of our present knowledge of physiology, as anything more than mere conductors; their functions depend solely upon their terminal apparatuses, and of these the central ones are as essential and more important than those of the periphery. We can follow the light through the dioptric mechanism of the eye to the rods and cones of Jacob's membrane, and then the process changes from a physical to a physiological one, and, however much we may speculate in regard to the function of the rods and cones, the exact manner in which the luminous impressions are received by them to be converted into nervous impulses, is absolutely unknown. From this point on, the visual mechanism is a sort of physiological telegraph, the retina being simply the sending apparatus, the optic nerve the conductor, and the receiving of the message and its delivery to consciousness are, of course, accomplished somewhere within the cerebrum. The process may be interrupted at any point of the route, the retina may be an imperfect instrument, the conducting fibres may be out of order, the centre at the base of the brain may be defective, or, finally, the conveyance to the centres where the impression is taken cognizance of by consciousness may be retarded or obstructed. This is the case as regards all sensations, and errors and delays are much the most likely to occur with our more complex ones, such as that of color, which is so often found deficient in

otherwise normal individuals. The exact locality of this defect of color-perception is of some practical as well as theoretical importance. In pathological cases it is sometimes accompanied with retinal disease, but this is not so with the congenital forms of color deficiency. If there is in these latter any retinal defect, we might hope, with the modern appliances for microscopic research, to find some structural alteration. A case of the *post-mortem* examination of a congenitally color-blind eye, has not, so far as I know, occurred since the death of Dr. Dalton, and then, the minute anatomy of the retina being at the time unknown, the investigation was confined to the humors of the eye, with, of course, a negative result. But if the retina is the part usually involved in color-blindness, or, rather, if correct color-perception usually depended on the healthy condition of the retina or the rods and cones, we might expect to see it impaired with whatever affected their nutrition, while, in fact, we do not find it necessarily abnormal with either an anæmic or a congested retina, or even with some serious retinal alterations that may affect the general visual power. The fact that color-perception varies in different portions of the retinal field, and especially decreases toward the periphery, does not appear particularly significant in this connection, for all the other niceties of vision follow similar rules. That the retina is a mechanism, the perfection of which is essential to correct color-vision as it is to all sight, is beyond question, but that color-blindness necessarily, or even generally, is due to its defects is extremely doubtful.

The grounds for referring the defect of color-perception to the higher cerebral centres seem much stronger. But there, also, direct anatomical evidence is lacking; we have no pathological facts, so far as known to me, of cerebral lesions directly connected with color-blindness. There are,

however, numerous clinical observations that point strongly in this direction, and some that are scarcely, if at all, intelligible with any other interpretation. Such are the cases of color-blindness in hysterical and hypnotic conditions, and those observed in certain cerebral diseases in which there is, so far as we know, no retinal or optic abnormality. Such a case as one mentioned by Charpentier in a recent paper,* as observed by him in Landolt's clinic, in which there was hemiopia limited to the color-vision, is very positive evidence in this direction, though it does not necessarily indicate a disorder as high as the perceptive centres. In addition, we have the facts of colored phantasms in cerebral disease. A lady of my acquaintance, who is subject to occasional severe migrainous attacks, has them sometimes preceded by a loss of power to perceive any color except red, which tinges all objects; and Dr. J. S. Jewell has described to me a case of a patient of his own who has, preceding his headaches, a brilliant play of colors occupying just one-half the visual field, the other half being normal. We have also, as instances, the color auras of certain epileptics, and it is needless to further multiply instances of this kind.

If we could obtain the testimony in full of all intelligent partially color-blind individuals, we could probably obtain some quite significant facts. My own experience seems to me somewhat to the point. I am partially red-green-blind, not very much so, but to a slight extent. My eyesight is excellent, V. $\frac{20}{20}$; a slight myopic astigmatism, $\frac{1}{36}$, or less, in the vertical meridian, is of no practical importance as a defect. The optic nerve and retina are healthy. I see a continuous colored spectrum from beyond the potash line to the extreme violet. The lithium line is a very beautiful and typical red, and if any portion of the spectrum is cut off or uncolored at the red end it must be extremely slight. I

* Read before French Assn. Adv. Sci. (Rep. in *Progrès Médical*, 1880). This JOURNAL, Oct., 1880.

recognize all the spectral colors as distinct in tint, except, perhaps, indigo, which seems only a variety of blue. I do not see any gray or uncolored stripe in the blue-green; in fact, my perception of spectral colors seems to be only weakened, not in any important respect lost. Yet, in pigments I am constantly liable to confusion, and frequently confound colors that to other persons are quite distinct. Sometimes, in using Holmgren's first test with the green skein, I put in all the usual confusion colors, and some that are not usually given as such. There is a special tendency to confuse certain browns with dark yellow-greens. The peculiar feature, however, that bears upon the point now under consideration, is that when I see two colors as alike, a closer inspection, requiring sometimes only a few seconds, sometimes even a minute or more, brings out a difference, not in shade or tone, but in tint, and I can generally correctly name the color. Then, again, in using Holmgren's test No. 1, I have to give my whole attention to the *nuances* of green, at one end or the other of the series, separately—that is, I am obliged to sort out the blue-greens by themselves, and in so doing I scarcely notice the yellow-greens, and *vice versa*. If this is not done, I leave in the pile of mixed skeins either a number of well-marked blue-greens or yellow-greens, which I readily recognize by themselves. It appears that my color-perception is not equal to covering the whole range of greens at once, though recognizing their common character when taken separately.

Again, in looking at a cherry-tree, or other dark foliaged tree with red fruit, I first see only a uniform dark green, but longer observation brings out the red color of the ripe fruit. This is independent of the form, for the color can be seen without my taking note of the form, and when the fruit is abundant and clustered, at a distance too great to well distinguish the form. Another instance of this peculiarity of

my color-vision is, that in looking at a certain painted glass window, a rosette of alternate leaflets of a yellowish-green and a tint of red of very nearly the same illumination and pattern, appears to me at first of all one color, but continued observation brings out the red, and afterward, as long as I continue to look at it, it is not possible for me to make the same confusion. I have frequently repeated this experiment, and generally with the same result. I say "generally," for I find my color-sense varies from day to day, and at times I distinguish colors more quickly than at others. On one occasion, with a perfectly new set of worsteds that I had never before tried, I was able to pass all of Holmgren's tests without making any notable mistakes or exhibiting anything more than a tendency to them. This, however, does not often happen, and more frequently this test would indicate, I think, a much more deficient color-sense than I really possess. I constantly observe this variability of my power to perceive colors, and have tried to make out its cause, or some rule by which it is governed, but so far with no result. I have a good faculty of mental imagery, and can generally recall rather vividly the color of any familiar object, and have sometimes thought that this might also be at fault when color-perception is at its worst, but careful observations in this regard have not verified the supposition. In fact, color-memory and color-perception appear to be somewhat independent of each other in my case, or, rather, the former does not fully reproduce the latter.

The fact that in the cases I have described I see the color or *nuance* and not the shade or tone, is to me a subjective certainty. The only way I can easily demonstrate it to others is by correctly naming the tint after it has impressed itself upon me, which I have often done. Indeed, the fact that two colors sometimes, at first sight,

look exactly alike to me, though afterward they appear different in tint, would seem to indicate that they were the same in shade, especially if I am to be credited with the usual acuteness in that direction of the partially or wholly color-blind. My power of discrimination in this respect is said to be, in reality, quite acute.

It appears highly probable that this psychic element enters much more largely into partial color-blindness than has been generally supposed. All of our senses have to be educated in infancy, and to this is possibly due, to a very great extent, the absolute vacancy in our minds in regard to the earlier months and years of our existence. The infant sees, that is, the light affects its optic nervous mechanism, but it conveys no adequate idea to its mind till, by the coöperation of its other senses, a true perception of the nature and relationship of things is evolved. Most people are still in the condition of infancy as regards the refinements of certain of their senses, the auditory sense, for example, which in some respects is so comparable to that of sight. In all these cases it is the higher centres that are at fault, and if there is any defect in the lower mechanism for receiving impressions, it will be likely to exaggerate itself in the cortical changes that are correlated with conscious perception. It may easily be, and indeed it appears highly probable, that a deficient early training and a lack of special observations of colors in early life, when the cerebral centres are receiving those first impressions that most strongly influence their organization, may have as their result in adult life a defect of color-sensibility, varying in degree from scarcely perceptible enfeeblement to pronounced partial color-blindness, or to dyschromatopsia, as in my own case. Disuse abolishes or weakens functions in the brain as in other organs, and there is no good physiological reason why special cerebral organs or centres may not be thus affected.

It may even be that to this, combined with heredity, is due the relatively greater frequency of the defect in the male sex.

I have not met with much mention in medical literature of this retardation of color-perception, which I myself experience. In his work on color-blindness, Dr. B. Joy Jeffries mentions incidentally, in one place, a slowness of color-perception which cannot, however, be very marked, for it is plain that by the test he usually employs, any hesitation or actual tendency to put in confusion colors is counted as color-blindness. He also gives an account of the examination of some pupils in an institute for the blind, who had still an ability to perceive colors. One lad, the least blind of them all as to form, etc., was able to name the colors of various objects correctly, but with hesitation; he said "he did not get hold of colors very well." The account is suggestive of the same difficulty that I myself have experienced, but the boy's partial blindness in other respects affects its value in this relation.

Ott and Prendergast,* in a paper on the rapidity of perception of colored lights, briefly allude to some practical points involved. The differences they noted in this respect are too slight to be exactly comparable with those I have described. They simply observed the differences of personal equation that probably exist more or less in every individual, while in my own case there seems to be a slowness of cortical functioning in the perception of certain tints, which can be to some extent overcome by conscious mental effort, and which, as I shall attempt to show, can be improved by education.

All these facts appear to indicate that, in some cases at least, the perception of color is largely a mental process involving a considerable element of time and attention, and

* This JOURNAL, April, 1880.

not a simple sensation. The higher cortical centres, therefore, must be the seat of the defect. The mental effort that is required is much like that needed to select a certain sound out of a number, such, for example, as that of a certain instrument or part out of an orchestra or chorus. The loud ticking of a clock may be as distinct as any other sound in a room, and yet make no impression upon consciousness until, by what is sometimes a labored direction of the attention, the nervous impulse reaches the seat of consciousness from the auditory apparatus, upon which the vibrations have all the while been acting. It appears to be in much such a way as this that my perception of certain colors, or rather of certain tints and shades of color, takes place; they do not impress themselves upon my consciousness until by a special effort my higher perceptive centres have been particularly devoted to their recognition. And when this concentration of attention is given I am all the more blind to other tints; I cannot see the yellow-greens well when looking for the blue-greens, and *vice versa*.

It is not an unnatural or unjustifiable inference that this perception, requiring a mental effort, may be modified by education; it is the rule that the mental powers improve by exercise. This brings me to the second point to which I wish to call attention,—that of the curability or modifiability of color-blindness.

It is generally assumed—there are very few who hold to the contrary—that congenital color-blindness is incurable. It may, perhaps, be admitted as highly probable that when absence of power to distinguish all colors, or any one fundamental color, is complete, that there is very little or no possibility of a change taking place. In this case there is no basis upon which to work; if, for example, the case is one of complete red-blindness, there is then no original sen

sation or perception of red to be cultivated or educated.* But when this dictum of the incurability of color-blindness is so extended as to apply to all the partial phases of the defect, it seems to me unphilosophical and unphysiological. If the defect is only an imperfect or retarded perception, as in my own case, located in the higher cerebral centres and partially compensated for by mental effort, the case is quite different from that of a complete absence of any fundamental color, both in its nature and its prognosis. There is, in such a case, no good ground for denying the possibility of an improvement or modification of the condition, and there are abundant reasons to the contrary. It would be against all analogies if it were not so. I will, however, here again cite my own experience.

Ever since childhood I have been aware of a difference in color-perception between myself and others. My earlier recollections in this line are of inability to see more than two colors—yellow and blue—in the rainbow, and of being a rather notable failure in the strawberry excursions of boyhood. The redness attributed to the rose and certain other flowers was also a puzzle to me. I did not come to a full appreciation of my defect till I was nearly twenty years old, when I had one day a dispute about the colors of a certain area of a map. Then I began to notice my color-sense and exercise myself on colors. Red, or what was called such,

* The statement of Cohn (*Deutsch. Med. Wochenschr.*, 1880, No. 16) that by hypnotism he was able to produce correct color-perception in two totally color-blind persons, and in one partially color-blind, appears to contradict this view, and to show that, even in these cases, there is a latent capacity for color-perception. That is, if there was no error in Cohn's observation. I have as yet seen only his preliminary communication, and do not know the full details of his experiment. All the subjective phenomena of hypnotism have, so far as I have been able to observe in my own experiments, apparently depended upon external suggestion for their incitation at least. If, therefore, I am allowed to offer a hypothesis to account for these cases, I should say that there was, from his suggestion, either verbal or inferred, that their color-sense would be modified by warming the eye, such a concentration of attention on this special faculty on the part of these three persons that, with the usual intensification of single faculties thus excited in the hypnotic state, their latent color-sense was excited into action. Their total color-blindness can be regarded, therefore, as only aggravated psychic dyschromatopsia or normal slowness of color-perception.

seemed to me to include a large range of colors from scarlet, which appeared to me as the type, to certain tints that seemed to me much more blue than red. Indeed, some tints called red by others appeared to me almost typically blue. I have no recollection of ever recognizing purple and violet in my childhood, and I do remember wondering why they were called anything more than varieties of blue. The exercise in colors which I gave myself taught me to recognize purple in some of its varieties when I was about twenty-one years of age. Shortly after this I had occasion to make a trip by water, and the importance of the recognition of colored signals in navigation occurring to me, I took pains to notice the side-lights of vessels, and I found my vision quite defective. I also noticed particularly that while at this time I could distinguish purple tints if I gave my attention to them, I had a very strong tendency to confuse them with the blues. I also noticed the variability of my color-sense at this time. I cannot say just when the change in my vision occurred; it must have been gradual, but at the present time I readily distinguish the purples and violets, and have only a very slight tendency to confound the lightest and least saturated of them with the blues, excepting at times when my eye for colors is unusually bad. The various tints of red are all distinguishable and quite different in appearance to what they were formerly; this is especially the case with the crimsons and rose tints. Within the past two years I have repeatedly tested myself with colored lights under practical conditions, and find that I make very few, if any, mistakes. There seems, in fact, to be a very marked improvement in my color-vision over what it was formerly.

It may be said 'by objectors that my present ability to distinguish colors that I formerly confounded, is due, not to any actual improvement or change in my power to per-

ceive them, but to practice with light and shade. All I can say to this objection is that any such assertion is not true, if I am to take the testimony of my own consciousness, rather than accept the *a priori* assumptions of others, who can by no possibility share it. I perceive light and shade at once, and better, I think, than the average individual, but the difference in tint between two colors that I am likely to confuse, such as very pale green and drab, and dark-yellow green and certain browns, only reveals itself to my eye slowly, and sometimes only after careful comparison, the illumination remaining all the while the same.

The practical importance of the slighter degrees of color-blindness, in some cases at least, is very much lessened, if it is admitted that the defect is located in the higher centres of the brain; that it amounts in some instances only to a functional defect of cortical cerebration, to be compensated for to a great extent by mental effort and attention; and that it is improvable by education and exercise. The usual test employed in this country for the examination of railway employees and pilots, that of Holmgren, makes, however, no allowance for this variety of color-defect. Dr. Jeffries, the principal authority on the subject in this country, says, in his directions for the use of this test, referring to the colored plate accompanying it: "If the person examined takes any of the confusion colors (1-5) to put with the green, he proves himself color-blind; or even if he seems to want to put them together." This rules out all hesitation, and condemns at once as defective any one who exhibits any uncertainty requiring mental effort or comparison. Holmgren's test has the advantage of detecting very slight abnormalities of color-vision, but it also has the defect of exaggerating them. As it is often used in this country, the person to be examined is required to select out all tints and shades of the color of the test skein, and in this

case, if it is not supplemented by some other test, it is liable to do injustice. There are many persons whose vision for colors is as good as the average, who still have idiosyncrasies in regard to the relationship of colors to each other, for instance, as to the exact limits between blue-greens and greenish-blues, yellow-greens and greenish-yellows, etc., and without going so far as to say with Stilling,* that by it a perfectly normal-eyed person may be made out color-blind, there is no question but that there is in it, when thus made, between examiner and examinee, a very large chance for erroneous diagnosis. Although my own defect is now, as nearly as can be ascertained from all the various tests employed, a slightly feeble or retarded perception of red and green, Holmgren's test No. 1, thus applied, may make me out as completely color-blind as the man who has no perception or sensation of red and green whatever.

When we consider that a man's whole livelihood may depend upon the result of the examination, the advisability of avoiding unnecessary mistakes is sufficiently obvious. Therefore, Holmgren's test should, I claim, be always carefully supplemented with some other that approaches more nearly the practical conditions that the color-sense must meet, in cases of incomplete color-blindness. Donder's test with lights seen through colored media in apertures of various sizes, appears to me much more satisfactory for practical purposes than the generally employed one of Holmgren.

I might discuss here at length the vision of the color-blind, and examine the claim made by Mr. Pole, that the red-blind individual, seeing red light as a dark saturated yellow, could yet distinguish it from the green, especially if the blue-green, the complementary color to red, and the tint advised by M. Redard in a recent report to the French government, is used instead of the manifold tints now em-

* Ueber das Sehen der Farbenblinden, p. 77.

ployed. My object in this paper, however, has been to notice the psychic element in partial color-blindness and its necessary consequence, the possibility of cure or modification of the defect. The following conclusions appear to me to be logically justified by the facts:

1. Color-blindness, when partial and incomplete, is, in some instances at least, a functional defect of the higher cortical centres concerned in sight. It amounts in some cases to merely a retardation of perception of certain colors, and may be compensated for to some extent by mental effort and attention.

2. Inasmuch as this form of color-defect is a mental one that can be more or less overcome by effort, there is a possibility of its modification, if not of its complete cure, by exercise and education, as it is the rule that the mental powers are improved by exercise. Its practical importance is, therefore, somewhat modified by this fact.

3. Holmgren's test, while revealing very slight defects of the color-sense, also magnifies them, and, as usually employed in this country, takes no account of this mental element. It should, therefore, in justice to the examined, be supplemented in all cases of partial color-blindness by other and more practical tests.

THE NATURE AND TREATMENT OF HEAD-ACHES.*

By J. S. JEWELL, M. D.

GENTLEMEN: There are but few forms of disorder which you will be called upon more frequently to study and treat in the practice of your profession than those passing under the general name headache. In this lecture it will not be possible to treat the subject exhaustively. All the clinical varieties of headache cannot be described for want of time. Some of the more important forms of this class of disorders will be mentioned with sufficient fulness to enable you to recognize them, and such reference to their treatment will be made as time may allow.

By headache (or cephalalgia) is meant pain in the head, not due immediately to any external cause, but, on the contrary, apparently depending on some internal, and, to common apprehension, obscure cause. The pain in headache may be persistent or occasional; it may be dull or lancinating; it may be steady or throbbing. It may be attended with abnormal heat of the head or not. It may be aggravated or ameliorated by either the upright or by the recumbent posture. It may be periodic or irregular; it may be unilateral or bilateral, and, if either, it may be regional,—that is, it may occupy the front, or vertex, or base; or it

* A lecture delivered in the Chicago Medical College.

may be general. It may be or not aggravated by mental or physical effort. It may be or not accompanied by vertigo, or by nausea, or by decided changes in vascular tension, or by other phenomena; all of which points are important to be observed and studied in relation to each particular case. Headaches differ as regards their nature, mode of origin, and proper methods of treatment, almost as widely as possible.

Your success in treating them will depend of course upon your ability first of all to recognize their true nature, and next upon the application of the proper remedies whether hygienic or medical.

Without further preliminary I will name and describe for practical or clinical purposes the more important forms of headache with which you are likely to meet. Then, in the first place, I would point you to those headaches which depend upon disease of the dura mater. Headaches depending upon acute but much more frequently subacute forms of disease of this sensitive membrane are very much more common than is ordinarily supposed. It is subject to various affections. Disease may be caused in it by the extension to it of diseases of the bones of the skull, such as result from injuries of various kinds, produced in falls on the head, or by blows, or by all kinds of mechanical injury. Affections of the dura, which are accompanied by pain, may occur suddenly or in varying periods of time, months or even years after an injury.

Affections of the dura may be caused by various constitutional conditions, as by the deposit of tubercular matter, especially along the course of its vessels, or by rheumatic action, and especially by syphilis. Essentially the same form of disorder as that which appears in the periosteum of the bones may affect the dura, giving rise to low grades of inflammation accompanied by pain. It sometimes follows

in the wake of sunstroke, severe exposures to cold, or arises from the extension of disease from the nasal to the cranial cavity, through the cribriform plate of the ethmoid bone, or from the middle ear as in otitis media. Affections of the dura, accompanied by pain from unknown causes, may occur, as happens in epidemic cerebro-spinal meningitis.

Various other forms of disease either of the bones of the skull or of the dura, in the way of tumors or growths of various kinds, may lead to affections of the dura of a painful nature. The Pacchionian bodies may themselves be the starting-points of inflammatory disorder of varying degrees of acuteness accompanied by pain. Disease of the brain or of the sinuses at its base may be the starting-points for painful affections of the dura. In this connection it is necessary to remember that painful, especially inflammatory affections of this membrane are, as a rule, localized rather than general. Small patches of the membrane may be the seats of disease, either in that part of the membrane which covers the floor or base of the skull, or its sides, or the vertex, or may be limited to one side, as so frequently is observed. It is the exception to have a general meningitis. Painful affections of the dura may occur at all ages, from infancy to the latest period in life. They generally occur, however, during later childhood, youth, and the middle periods in life.

I desire next to call your attention to the peculiar characteristics of the pain depending upon acute or subacute affections of the dura. The headache which results from acute, but much more often from subacute, affections of the dura is, in the first place, more or less definitely localized. This is not always the case, but such is the rule. In the second place, the pain continues to occupy the same part of the head. It does not shift from place to place as

it does in many of the circumscribed pains of neuralgia. In the third place, the headache which results from the disorders now under consideration is persistent. Unlike the pain in many other forms of headache, it seldom entirely ceases long at a time so long as the meningitis continues. It seldom begins suddenly ; as a rule, gradually. It almost never disappears suddenly, but, as a rule, slowly. It is generally aggravated by anything which increases the activity of the intracranial circulation. It is aggravated by shocks to the head. It is not relieved in assuming the lying-down posture. It is aggravated when the head is permitted to hang down. As a rule, it is made worse by increased barometric pressure, and by the sudden occurrence of cold weather, or by exposures of the surface to cold by which the cutaneous vessels are contracted, or by any other means by which vascular tension is increased, or by any means by which the cutaneous circulation is diminished in activity or repressed. It is occasionally throbbing in character where cardiac pressure and activity are increased. It is accompanied generally by more or less mental depression, and by nervous irritability, discouragement, and disinclination for mental and physical labor. Such are the more prominent signs of this form of headache. It is rarely, though sometimes it is, accompanied by nausea. It may or may not be accompanied by increased temperature of the head, though it very frequently is by an increase of temperature in that part of the scalp or skull which corresponds to the site of internal disease. This depends greatly, however, upon the seat or degree of acuteness of the disease.

This form of headache may be complicated or even in a measure obscured by others, for it is not uncommon to meet with complex cases. Headache of the kind I have just described is not only persistent, but difficult to remove by treatment. The management which has been

most effective upon the whole, in my experience, is the following :

In the first place it is necessary for the patient to be kept as quiet as possible. Loud noises, bright lights, exciting circumstances of any or all kinds, as far as possible, are to be avoided. All exercise, whether physical or mental, except the most moderate, should be avoided. It is best for the patient to be separated from company, and, if practicable, confined to the room and to the bed. If taken out-of-doors, it is best for the patient to walk quietly or ride in an easy conveyance, so as to avoid excitations and fatigue. The diet should be very unstimulating, and, though nutritious, simple in kind and very moderate in quantity. All disturbance of the stomach should be avoided. If an undue amount of acid should appear in the stomach, it should be immediately neutralized. The bowels should be kept entirely free. If there is irritation of the bladder, measures should be taken to allay it. All sexual indulgence or excitement should be avoided. All the sleep that can be secured should be had. The patient should sleep upon a gently inclined plane formed by putting blocks of wood under the headposts of the bed, from four to eight inches in height. By this means the blood is made to gravitate away from the head and relief is obtained. A warm climate should be secured rather than a cold one. By this means a free circulation of blood in the surface is more easily maintained. A climate situated some distance above the sea level where barometric pressure is habitually low, is better than at the sea level, and in general, a warm, steady climate is most favorable. The surface should be thoroughly protected from exposures to cold air. Alcoholic stimulants and strong coffee and tea, as a rule, should be avoided in this form of headache. Protracted hot foot baths are in order.

As regards medical treatment, much depends upon the stage and conditions of the disorder, and in general, it may be said that, from the epidemic cerebro-spinal meningitis down to an ordinary localized sub-acute pachymeningitis, one of the best remedies, as well as palliatives, is opium, either in the watery pillular extract or the deodorized tincture. In this class of cases these preparations of opium are to be preferred to any others. The opium should be given in doses of such size and frequency as to subdue the pain, and continued until, in conjunction with other measures, the pain subsides, when the use of the anodyne may be gradually withdrawn. Side by side with this, it is necessary to employ large doses of the iodide of potassium. For an adult, ten grains may be given three times a day to begin with. Each day the dose may be augmented by five grains, until decided evidences are given that the remedy has produced results. If duly diluted with water from fifty to one hundred grains may be given three times a day, if necessary. In connection with this, more especially if the disorder is syphilitic in origin, inunctions of mercury may be employed. For this purpose the oleate is to be preferred. Ten grains of the stronger oleate to an ounce of cosmoline, which may have an agreeable odor imparted to it by a drop or two of the oil of roses, if thoroughly mixed, makes an eligible form for the inunction, which may be employed once or twice daily, until the effect of the mercury is unmistakably perceived. Counter-irritation behind the ears and along the back of the neck by means of the actual cautery or by blistering collodion I have found useful.

Under this treatment, in the course of a few days or at most a few weeks, the pain abates. In the later progress of the case tonics, such as acid solutions of strychnia and quinine, may be given, according to the exigencies of the

case. Such is an outline of the management of headaches depending on meningitis either general or localized. In the progress of different cases, many other points will arise requiring attention, but these need not be discussed at present.

In the second place I wish to call your attention to headaches of the *vaso-motor type*.

This class is the widest and most important of all. It includes two features: abnormal sensitiveness of certain parts of the nervous system, and violent fluctuations in blood supply, especially in certain parts of the nervous system. It may be divided at once into two grand classes: First, the pure *migraine* or hemicrania, which recurs at more or less regular intervals and is capable of hereditary transmission. Secondly, a class of headaches in healthy persons that depend on vaso-motor disorders which follow in the wake of digestive affections, loss of sleep and a variety of other circumstances which recur irregularly, are easily cured by removing or avoiding their causes, and are not transmissible by heredity.

I will direct attention first to the true *migraine* or hemicrania. These headaches recur at more or less regular intervals, say once in one or two weeks, or in a month. The intervals are sometimes longer. In a few instances they exhibit a true periodicity. The intervals between the attacks are usually free from pain. They occur, as a rule, in persons having a decidedly nervous or neuro-sanguine temperament. They are most frequently, perhaps, confined to one side of the head, especially in that part which lies in front of a line drawn over the top of the head from one ear to the other. They may, however, affect both sides of the head simultaneously, in the front or top, or in the occiput and base, or they may be generalized. They seldom begin suddenly, generally with initial symptoms

which vary in different cases. In the majority of instances there are certain gastric symptoms, such as variations from the ordinary character of the appetite, generally some loss of the same, a coated tongue, the coat, as a rule, being of the white epithelial sort. There is often nausea, mental depression, occasionally vertigo, disinclination for mental or physical labor in a majority of cases, chilliness, coolness of the extremities, abnormal variations in vascular tension, increased sensitiveness of the vaso-motor reflexes, sometimes a pallid face and cool surface, at other times a flushed face with elevated temperature about the head, and if confined to one side of the head there is often a marked change in vascularity in the skin and conjunctiva, state of the pupil, etc., on the affected side. In true hemicrania there are at least two particular varieties as distinguished by superficial symptoms. The one noticed first, perhaps, by DuBois Reymond in which there is pallor and coldness of the skin on the affected side of the head, with a local increase in vascular tension, which form passes under the name given it by the author just mentioned,—*hemicrania, sympathico-tonica*; and the other in which there is increased redness and an elevated temperature in the skin of the affected side of the head. This variety was first described by Moellendorf under the title of *hemicrania neuro-paralytica*. There are other cases in which there does not seem to be any change from a healthy average in vascularity or temperature. These varieties have only a superficial importance, and in my judgment deserve nothing more than a passing notice. When the attack is once ushered in the pain is usually very severe. As a rule it unfits the sufferer for all occupation. The pain is often of a throbbing character, the throbbing corresponding to cardiac impulses. This is a significant fact as I will try to show you later. The patient, as a rule, retires to the quiet of the bed-

chamber, lies down, closes the eyes, avoids as far as possible every cause for excitement or annoyance, endeavors to secure the most perfect mental and physical quietude until relief shall come.

In the vast majority of cases there is more or less pronounced nausea, and in many, vomiting. As a rule nothing is ejected from the stomach, aside from the food which may happen to be present, or a little acid mucus at times tinged with bile. In many cases the attacks of vomiting are repeated and exceedingly distressing in character; the pain meanwhile may be almost unbearable. In the majority of cases there are rigors or decided chilly spells, and in a few instances, in the middle and later stages of the attack, some fever. As might be expected, from what has been said, the force of the pulse is often diminished and its rapidity variable.

Such are the more important surface symptoms belonging to this class of headaches. They occur in both sexes, more frequently perhaps in the female, especially just before the occurrence of or during the menstrual period. These headaches appear more frequently from later childhood until about or after the close of the middle period in life. In some instances, however, they may occur in quite young children or continue into old age.

There are certain points in regard to this class of headaches to which especial attention should be directed. In the first place, it is to be noticed that in the majority of cases, during the interval between attacks, the individual is absolutely free from headache. In many instances the health seems perfect, except during or about the time of the attack. In the second place, it is to be noticed that such cases always involve circulatory disorder. At least, so far as my own observation extends, this is true. In the third place, it is to be observed that they occur almost en-

tirely within the sphere of the trigeminus, especially its upper division, that is, the part which is distributed to the orbit—its deep temporal branches,—but above all others the pain appears to have its peripheral seat in those branches of the nerve in question distributed to the dura. In the fourth place, all measures for relief, whether hygienic or medical, which have led to good results so far as palliation is concerned, are almost, without exception, such as diminish or remove excitation, *blunt the pain sense*, and steady and equalize the action of the vascular system. Any measure adopted by which these results are secured usually leads to good results. And lastly, it is worthy of note that the affection is capable of hereditary transmission.

All these points should be inquired after in the history of the case. Without occupying time in discussing the various steps in the process of reasoning by which the conclusions have been reached, I may say to you at once that two points are made rather clear in the analysis of facts. One is, that there is an abnormal increase in the pain sense in certain divisions of the trigeminus, and second, the occurrence of certain violent vaso-motor disorders in the limits of the same parts. It is difficult, perhaps impossible, in view of our present knowledge of the structure and modes of action of the nervous system, to understand how these headaches can occur and be limited strictly to certain parts of the nervous system, without admitting an exaltation of the pain sense, in the parts involved in disease, as the necessary undertone or background of the morbid picture. All extended reasoning on the facts of the case seems to make some such conclusion necessary.

In connection with this it is to be noticed that individuals who suffer from this form of headache have usually what is called a nervous temperament, in which the sensibilities of the nervous system are, as a whole, morbidly

acute. They are found often to have an unfortunate hereditary strain or bias. The parents have, one or both, been afflicted with similar headaches, or with neuralgias, melancholias, paralyses, or some other nerve disorders.

The real seat of the organic affection upon which the exaltation of the pain sense depends, is the nerve centre, or that portion of the trigeminal nucleus, back to which the nerve fibres go which are distributed in the neuralgic area. It is not in the nerve trunks themselves distributed to the dura.

The organic condition of the portion of the trigeminal nucleus in question is, probably, much the same as it is in ordinary trigeminal neuralgias of long standing, and in which it often happens that a touch on the skin of the face, or the play of a current of air on the same, is sufficient to provoke a severe neuralgic attack.

The abnormal exaltation of the pain sense being given as a more or less constant factor, the exciting causes of the attacks are sudden and violent fluctuations in blood supply in certain parts of the affected regions.

In one class of these cases of hemicrania, DuBois Reymond supposed that the pain is due to contraction of the arterial walls of the temporal artery and its branches. The contraction, in his opinion, gave rise to pinching or some similar condition of the nerve distributed to the vessels, and hence the pain. In the opinion of Moellendorf, the pain was due, not to contraction, but to distension of the vessels in the same region. Distension of the blood-vessels led to painful stretching or tension of nerves in the affected region, and hence the pain.

As I have said to you already, there are many cases in which neither of these conditions are present in noticeable degree, and yet the pain exists. It cannot always, therefore, depend upon the conditions of the external circulation

mentioned by these observers. But they may well cause certain attacks, when it is remembered how fluctuations in blood supply cause pain in other parts. If a foot or a hand is permitted to hang down when inflamed, or when the head is hung down during the existence of some acute or painful intracranial affection, the change in vascular tension gives rise to acute pain. Local changes in vascular tension, though produced by local vaso-motor irregularities instead of by changes in posture, if they occur in an area the nerves of which lead back to a painfully sensitive centre, may in this way, as readily as in any other, be the occasion of pain.

It is probable, however, that the seat of these extreme vascular changes is chiefly intracranial,—in certain portions of the dura itself, or, it may be, in the hyperalgetic centre itself. All this may be, and yet similar morbid circulatory phenomena be at times manifested externally as well as internally.

Then, again, it is found that many forms of pain, especially what are called weather pains, depend upon changes in barometric pressure, which, in their turn, imply changes in vascular pressure. If, in any case, there should exist in the central nervous system, as, for example, at the central termination of the trigeminus, some weakened vascular area, there is almost uniformly augmented pain as a result under the conditions mentioned.

It is also well known that in the head itself, as well as in other parts, every heart-throb often gives rise to an increase in pain, which continues during the existence of the cardiac impulse, and terminates with it. All these and other facts go to show that more or less violent or sudden changes in vascular pressure give rise to increased pain, and by parity of reasoning, may give rise to pain where it had not existed before. This class of cases presupposes an in-

herited or at least a morbid facility in particular zones of the vaso-motor nerve apparatus to irregularities in action. This condition of affairs is observed in certain other disorders, chief among which is epilepsy. The chief difference between migraine and epilepsy, it has long seemed to me, is this : The vaso-motor disorders are the same in kind, but do not occur in the same regions.

The one in epilepsy occurs in the cortex of the brain, and hence leads to a disturbance or to a loss of consciousness, accompanied usually by certain morbid muscular phenomena. The same kind of a disorder, or one similar, however, occurs in migraine, but in a quite different region. The dura and that part of the trigeminal nucleus back to which fibres from the dura extend, appear to me to be the chief seats of disorder.

The cortex itself is not involved, at least not to any considerable extent. For a long time various observers have noted the close relation which exists between migraine and epilepsy. That relation appears to me to be the one to which I have just referred. The disorders are the same, but occupy different horizons in the central and peripheral nervous system. The disorder in question may extend in one direction so as to produce an epilepsy in another so as to produce a migraine, or finally to produce both in the same case, as I have frequently observed. So much, then, for those vaso-motor headaches, which depend principally or chiefly upon an unstable state of certain parts of the nervous system. Of course the vaso-motor action is reflex, and its occurrence depends less upon the exciting than upon the predisposing causes. The latter preponderate. What the causes of periodicity are, why a patient remains well for a month and then has a severe attack of migraine, and then recovers and appears perfectly well for a season, and so on, I do not

know. If any one else knows these things I have yet to learn who does.

I now pass to the consideration of that class of cases in which the exciting causes appear to be the particular subjects for consideration, and without the existence of which, in some abnormal degree, the headaches would not occur.

In the class of cases just described the exciting causes are comparatively slight; in the class now to be described they are all important. In the class of cases now to be described there is of necessity no morbid facility, whether hereditary or acquired, toward irregular vaso-motor action. But there are exciting causes, such as irritative disorder of the alimentary or generative systems, excitations from which important regions finally lead to irregularities in vaso-motor action within the head. Of this class of cases the following particulars are to be observed: In the first place they are never, except by accident, periodic. In the second place they are almost never unilateral but bilateral, and are, as a rule, perhaps general rather than local. In the third place, as a rule, they are not very acute. In the fourth place they are seldom connected with nausea, and in the fifth place they nearly always follow in the wake of over-exertion, errors in diet, indigestion, constipation, loss of sleep, etc., in an otherwise healthy person. If they arise from digestive disorder they are usually frontal; if from unusual mental exertion, they are either vertical or frontal; but if from disorder of the generative organs, they are usually perhaps occipital or basilar. This class of headaches may therefore be traced usually to overwork, undue anxiety, loss of sleep and in other ways, by reason of which conditions the brain or certain of its parts become and remain hyperæmic. Under such circumstances persistence in mental labor or excitement only increases the congestion which,

it is presumed, is the cause of the headache in connection with an irritable state of the brain.

Then certain disorders of the digestive system, such as overloading the stomach with indigestible food, gastric catarrh, serious constipation, and, as results, irritation of the alimentary tract, exhaustion from overwork in various ways, including losses of sleep, and finally genito-urinary disorders, more particularly in women, lead to the headaches now under consideration. The mechanism of this class of headaches appears to be as follows: There is first of all, except when a result of over brain work, a temporary irritative or over-sensitive state either of the nervous system as a whole, or of some parts of the brain in particular. In the next place, within these irritable zones there are rather violent fluctuations in blood supply especially tending toward congestions. The temperature of the head, as a rule, is elevated in this class of cases. These circulatory disturbances are produced by means of irritation or excitations, more particularly in certain peripheral tracts, such as the mucous membrane of the stomach or the membrane just below it. Gastro-duodenal catarrhs are especially liable, in connection with dyspepsias, to which they give rise, to produce vascular disturbances in the brain and about the head just referred to. Next in order are chronic affections of the lower intestine, especially of either extremity, as about the cæcum or the sigmoid flexure; catarrhal disorders of the mucous membrane of these portions of the colon, especially if accompanied by constipation in the course of which masses of fæcal matter accumulate in the colon to irritate by their presence the diseased membrane. Then, in a large number of cases of disease of the neck of the womb which is very sensitive, and in irritative affections of the ovaries, headaches arise of the kind just described, particularly at the time of the menstrual period. In this class, the headaches, as already

said, do not depend upon hereditary tendency to such disorders, but upon the strength and duration of the exciting causes. It is this class of headaches which are relieved by emetics, by abstinence from food, by brisk purgatives of various kinds, by the passage of the menstrual period, by cessation from work, by rest, etc. A careful examination of the history of a case belonging to this class of headaches will usually lay bare the morbid condition which plays the part of exciting cause and upon the removal of which the cure of the headache depends. After the description and explanations just given of the great group of headaches which have been classed as vaso-motor, I will call your attention to their treatment.

(To be Continued.)

MICROSCOPIC STUDIES ON THE CENTRAL NERVOUS SYSTEM OF REPTILES AND BATRACHIANS.

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ARTICLE III.

DIAMETERS OF THE NUCLEI OF THE LARGE NERVE CELLS IN THE
SPINAL CORD (*continued*), ALSO OF THOSE WHICH GIVE
ORIGIN TO THE MOTOR FIBRES OF THE
CRANIAL NERVES.

SINCE writing article II of this series, I have met with nothing which could fairly be regarded as an objection to the law then presented, but have, on the contrary, noted many new facts which tend to strengthen it and widen its application. Nuclei which, by means of the prolongations of their surrounding cell masses, are related to muscles, have been carefully measured throughout the entire nervous system.

Scattered cells, like those found singly or in pairs near the course of the abducens nerve, with those which I have elsewhere described as existing in the meshes of the raphe of the alligator, and certain large cells in lizards, serpents, and turtles which appear to be connected with the acoustic or facial nerves, may all be classed as of doubtful function. Although the diameters of their nuclei may in some cases seem to furnish exceptions to the rule, so long as their anatomical relations remain obscure nothing can be definitely affirmed about them in this connection.

I would suggest, however, to those who may feel disposed to regard these cells as connected with the sense of hearing, that such a view involves giving to this apparatus, in its central portion, a structure almost identical with one universally admitted to be motor, like, for example, that concerned in raising the lower jaw ; whereas in the central structures for vision and olfaction the cells are all very small.

Moreover, these large cells, found in the vicinity of the acoustic nerve in some lizards, turtles and serpents, are not found at all in the frog, while in the alligator their position indicates that they may be related to the motor branch of the fifth pair or possibly to the branch which supplies the depressor muscles of the lower jaw. The eminentia acoustica in the latter animal swarms with uniformly small cells and nuclei which are very probably the sole centres for the acoustic nerve, and in the same relative plane the same numerous groups of small cells can be seen in frogs and some lizards.

During the past summer, through the kindness of Prof. S. F. Baird, of the Smithsonian Institution, quite a number of valuable specimens have been placed at my disposal, among which may be mentioned *Heloderma Suspectum*, several serpents and one large example of *Chelydra Serpentina*.

Nuclei of the cells of the inferior (anterior) horns of the caudal, lumbar, dorsal, cervical and upper cervical regions of the spinal cord, in a large number of frogs of three species, two species of emys and two of land turtles, and in several alligators and lizards, including *heloderma*, have been measured. Of those found in the cervical and lumbar enlargements enough has been written already in the two preceding papers. The preponderance in average size is here in striking accord with that of the power of the

related extremities, and has since been repeatedly confirmed in frogs,* especially in longitudinal sections.

The caudal region in turtles and in those lizards which have few and delicate caudal muscles furnishes an interesting fact for consideration. In turtles the cell nuclei gradually diminish in size from before backward, and finally disappear altogether near the posterior portion, where the horns of gray matter present much the same appearance, as to structure, as that of the same parts in the dorsal region.

While in the alligator some of the largest cell nuclei are met with in this part of the cord, in those saurians, heloderma especially, which have comparatively little power in the tail, these elements are reduced gradually in size in the same sense as are those in the turtle. The same gradual transition is well marked in the caudal region of *Scincus Erythrocephalus*.

Stieda* gives measurements of nerve cells and their nuclei from the various parts of the spinal cord in *Testudo Græca* and *Emys Europæa*, agreeing with my own made later, and concludes as follows:

"I guard myself expressly against the supposition that the great differences in size between these three (large, medium-sized, and small) classes of cells are evidences of different physiological importance in these elements. I wish rather to assert that what is found in the spinal cord of the turtle can and must be used to support the contrary view. The fact that in the caudal and dorsal regions no large cells exist, but only medium-sized and small cells, while inferior (motor) roots are given out from these same regions,

* In the spinal cord of a bat which I have lately examined, the nuclei of the cervical region were found to be far more abundant than those of the lumbar region, and their average diameter somewhat greater. The muscles of the two pair of extremities bear the same sort of relation to each other.

"Ueber den bau des centralen nerven systems der amphibien und reptilien." Axoloti and Schildkröte, Leipzig, 1875, p. 40.

must have great weight against the conclusion that only the large nerve cells are connected with motor fibres." Accepting the passage as it stands I agree with him, but he has not fairly stated the ordinary view. It does not seem to me that "only the large nerve cells are connected with motor fibres," represents fairly the prevailing belief of anatomists and physiologists. That all the large nerve cells are thus connected is more accurately what is thought to be the fact. Of course, no one has ever claimed that the cells of origin of the oculomotorius, for example, were large cells or doubted that they were in connection with the fibres of the third pair of cranial nerves. Nerve cells, therefore, may be small and still be connected with motor nerve filaments. In the dorsal and caudal regions of the spinal cord of turtles the motor cells are small, because the muscles which they innervate are small. At the same time, it may be true that all large cells connect with motor filaments. To me, this is all in favor of ascribing difference in energy to different-sized cells or rather nuclei. The nucleus can be accurately measured, while the body of the cell can not be, and as the former probably constitutes the true cell, it has been preferred as an object of study in my researches.

MEASUREMENTS OF THE DIAMETERS OF THE NUCLEI OF NERVE CELLS WHICH ARE RELATED TO THE MOTOR FIBRES OF THE CRANIAL NERVES.

1. In four species of turtle, viz.: (1) *Emys Floridana*, (2) *Emys Terrapin*, (3) *Testudo Polyphemus*, and (4) *Chelydra Serpentina*, the following have been found to be the comparative dimensions of these nuclei:

The largest nuclei are found in the cells of the spinal cord and those of the nucleus basilaris of Stieda. Next to these in size are those of the centre for the motor root of the trigeminus, supplying with its fibres the elevator mus-

cles of the lower jaw and next those of the centres of the oculomotorius. This is true of all four species.

In the first three animals weighing about four pounds each, the nuclei for the respective centres were about equal, while differing in size in each individual as stated above. In the *Chelydra Serpentina* (snapping turtle weighing $24\frac{1}{2}$ pounds) all the motor nuclei were much larger than those of the smaller specimens. The same rule holds true in frogs and alligators. The smaller the animal, the smaller the cell nuclei. I have not seen any mention of this fact in any works on anatomy.

2. The nervous centres of the alligator are especially well fitted for sections, and I have obtained three series of preparations, many hundred in all, showing the nuclei of the cells of origin of all the motor nerves. In this animal, the cell nuclei of the motor root of the trigeminus are found to occupy, as to size, the same middle rank between the nuclei of the oculomotorius and those of the motor roots of the spinal nerves, that they do in the turtle. These nuclei are remarkably large in both the alligator and snapping turtle.

3. In frogs the rule is even more strikingly illustrated than in the animals just mentioned. Anatomists have, as yet, made no centre for the hypoglossus, but it is interesting to note that, the nuclei of the cells forming the "nucleus centralis" of Steida, described and figured also by Reissner (the natural centre for this nerve), have a diameter just between that of the nuclei related to the oculomotorius and those related to the motor root of the trigeminus.

The constant variations in the size of these elements above indicated have been clearly illustrated by photography. By employing exactly the same degree of enlargement—by using the same objective and having the same distance always between the focusing screen and micro-

scope—for all the nuclei of the same animal, a very accurate representation of the actual condition is possible.

These photographs can now be examined at the library of the Academy of Medicine, the New York Hospital library, College of Physicians, Philadelphia, Surgeon-General's office and Smithsonian Institute, Washington, and at some university libraries. The same subjects, with over a hundred others, printed by the Artotype process on plate paper, showing the structure of the central nervous system of all the North American reptiles, will soon be published.

RECAPITULATION OF THE FACTS OBSERVED IN REGARD TO THE SIZE OF THE NUCLEI OF THE NERVE CELLS IN THE SPINAL CORD AND BRAIN OF REPTILES AND FROGS.

I. —FROG.

Diameters in divisions of Nachet's micrometer eye-piece with objective No. 5 :

Spinal cord, brachial enlargement	.	.	.	6.5 x 8.
“ crural “	.	.	.	7. x 9.
Centre of motor root of trigeminus.	.	.	.	6. x 6.5
Possible centre of hypoglossus	.	.	.	4.5 x 6.
Centre of oculomotorius	.	.	.	3.5 x 4.5

II.—EMYS FLORIDANA.

Spinal cord, cervical enlargement	.	.	.	6. x 6.5
“ lumbar “	.	.	.	6. x 7.
Dorsal region	.	.	.	2. - 4.
Caudal “ gradually diminishing	.	.	.	6. - 2.
Centre of motor root of the trigeminus	.	.	.	5. x 5.
Cerebellum, large cells	.	.	.	4. x 5.
Centre of oculomotorius	.	.	.	3.5 x 4.5
Cerebrum	.	.	.	3.5 x 5.
Optic tubercles	.	.	.	3. x 3.5

III.—TESTUDO POLYPHEMUS.

Same as emys, except in spinal cord where the conditions are reversed in the two enlargements.

IV.—ALLIGATOR MISSISSIPIENSIS.

Spinal cord, cervical enlargement	.	.	.	6.5 x 7.5
“ lumbar “	.	.	.	6.5 x 7.5
Centre of motor cord of the trigeminus	.	.	.	6. x 7.
“ motor portion of the vagus	.	.	.	5.5 x 6.
“ oculomotorius	.	.	.	5. x 5.
Large cells of the raphe	.	.	.	7. x 8.
Nuclei of eminentia acoustica	.	.	.	3.5 x 4.5
Sensitive cells of the vagus	.	.	.	3.5 x 4.5
Large cells of the cerebellum	.	.	.	3.5 x 4.5
Cerebrum and corpus striatum	.	.	.	3.5 x 4.5
Optic tubercles	.	.	.	2.5 x 3.

V.—HELODERMA SUSPECTUM.

With the exception of the caudal region of the spinal cord, where much the same scarcity and successive reduction of size of the nuclei exist as in the turtle, the diameters hold the same relation to each other as noted in the alligator. This remark also applies to the nuclei of *Scincus Erythrocephalus*.

VI.—ERYTHROCEPHALUS.

The nerve cell nuclei of small specimens are notably smaller than the corresponding nuclei of larger specimens of the same order. This rule only applies to orders, for some of the nuclei of *Rana Pipiens*, from the spinal cord, measure as much as those of the 24-pound turtle. The nuclei of the small lizards are, as a whole, proportionally larger than those of *heloderma* or the alligator.

The proposed law, formulated in my last paper, may now read as follows :

The nuclei of the so-called motor cells of the central nervous system have, in the same individual, average diameters, which are proportional to the power developed in the related muscles.

The writer, in conclusion, while admitting the incompleteness of his work, must at least claim to have demonstrated the fact that a hitherto unobserved relation exists between the size of a motor nucleus and that of its peripheral organ, the muscle.

A HISTORICAL CASE OF IMPULSIVE MONOMANIA.

By EDWARD C. SPITZKA, M.D.

IN reading a recent sketch of Samuel Johnson's life, I was struck by the marked evidences of mental aberration exhibited by that writer, according to the account given by his biographer.* It has been the fashion among English alienists to study historical illustrations of insanity, and it would be remarkable if the very curious case of Samuel Johnson had escaped their scrutiny. However, the only reference to his mental state which occurs to me, does not deal with its salient points, and I am unacquainted with any article which mentions Johnson as an illustration of impulsive monomania (*Primære Verruecktheit in Zwangsvorstellungen*). At some risk of unconsciously repeating what may have been already said, I shall briefly comment upon his case.

Samuel Johnson suffered from a hereditary taint as well as from severe physical disease. It is known that his mother took him to London to be touched by the Queen for the "King's Evil," and that this disease (whatever it was) had seriously impaired his eyesight.

His father was tormented by hypochondriacal tendencies, and it appears that Samuel himself exhibited the same

* Leslie Stephen's life of Johnson, in "English Men of Letters," published by Harper & Bros.

symptom. Among the signs of heredity, I regard Samuel Johnson's total insensibility to music. This feature has been frequently observed as a transmitted peculiarity in families afflicted with insanity.*

The evident symptoms of impulsive monomania in Johnson were the following: When entering the doorway with his blind companion, Mrs. Williams, he would suddenly desert her in order to whirl and twist about in strange gesticulations; this performance appeared as of the nature of a superstitious ceremonial, and he would stop in a street or the middle of a room to go through it correctly. Once he collected a laughing mob in Twickenham meadows by his antics. On this occasion his hands imitated the motions of a jockey riding at full speed, his feet twisting in and out to make heels and toes touch alternately. He presently sat down and took out a Grotius "*De Veritate*" over which he "see-sawed" so violently that the mob ran back to see what was the matter.

Once in such a fit he suddenly twisted off the shoe of a lady who sat by him. Sometimes, as his biographers add, "he seemed to be obeying some hidden impulse," which commanded him to touch every post in a street or tread on the centre of every paving-stone, and he would return and go over it again if the task had not been accurately performed.

The only alienist who refers to Johnson seems to imply that he was of sound mind. In his article on "Delusions and Hallucinations," Ray† says: "We know very well that hallucinations have been exhibited by men of great mental endowments and activity, *as insulated facts having little or no connection with the ordinary mental movements.* Dr.

* Muhr: *Archiv für Psychiatrie*, vi.

In two cases of transmitted constitutional insanity, in one of which, lack of the musical sense was noted, in the other, nothing being known on this head, I found the *striæ medullares acustici* altogether absent.

† Contributions to Mental Pathology, by Isaac Ray. Boston, 1873.

Johnson, while walking in the street, thought he heard the voice of his mother, then many miles away, calling to him 'Sam, Sam.' " Further on, our author states that "In most, if not all of these cases, there was undoubtedly some cerebral defect,"—but the interesting facts here detailed must have been unknown to him, as I infer from the italicized lines. In fact, on page 544, the same author says: "By no English writer have the delusions of pure monomania been more truthfully represented than by Dr. Johnson in 'Rasselas,'—an achievement *we should hardly have expected from one whose own mental movements were of the most regular and measured character.*" (Italics mine.)

The fact referred to is a proof of the great family relationship existing between delusional and impulsive monomania, and the ability to throw himself into the rôle of a delusional monomaniac is not to be wondered at in Johnson, who had imperative conceptions and hallucinations himself.

It displays a good insight into Johnson's character on the part of his biographer when the latter states, of Johnson, "if he had gone through the excitement of a religious conversion, he would probably have ended his days in a mad-house."

It was said by those who knew him during life, and this is confirmed by such writings as he left behind him, that although a man of deep power of feeling and of acute perception, yet that his views were very narrow. While one may question whether it would be just to consider his well-known antipathy to everything Scotch as a symptom of insanity, yet his bigotry on the question of the Stuart dynasty was, to say the least, remarkable in a man of otherwise high intellectual standing, being utterly out of harmony with his time, surroundings and interests, not to say the dictates of common sense.

Johnson was a man of fitful energy, and his fits of industry alternated with long periods of indolence.

Many impulsive and even delusional monomaniacs possess these same traits, and the faculty of rude repartee which Johnson had is not by any means rare in the asylum corridor. Like Johnson, there are patients in asylums and out of them, who have a prodigious memory, have accumulated vast stores of miscellaneous learning, are versatile, and would pass, as Johnson did, for nothing more than "eccentric."

Had Samuel Johnson lived in the state of New York in the present time and proved disagreeable to his relatives, or had he performed his antics on Broadway, who doubts that he would have been committed to an asylum with the evidences of impulsive insanity so palpably evident as they were in his case? Who can help but register a protest against the indiscriminate committing power which courts and physicians possess, and which every now and again consigns people with no evidences of insanity greater than those of Johnson, with good if not as good mental endowments, useful members of society often, to the living tomb of an asylum, and to the tender mercies of perhaps an ex-horse-car conductor, ex-night-watchman or other politician.

Another valuable lesson to be drawn from the case of Samuel Johnson is the strong proof it constitutes of the existence of partial insanities. His moral faculties were of the highest order, his perceptions were acute, his memory prodigious, his judgment was looked up to by his contemporaries,—in short, his only evident derangement was that manifested in his morbid impulses. The excessive fear of death, I attach but little weight to, in his case.

SURGERY AMONG THE INSANE.

By ALLEN W. HAGENBACH, M.D.,

ASST. SUPT., COOK CO. HOSPITAL FOR INSANE.

DURING a residence of five years in the Cook Co. Hospital for Insane, I have frequently met with interesting surgical cases, a few of which are here reported as examples of the surgical cases usually met with in hospitals for the insane, at the same time illustrating some of the difficulties encountered in their treatment. All the following cases not otherwise credited, excepting the case of perineal abscess and mortification of the scrotum, have occurred among the inmates of this asylum. The exceptional patient was an inmate of the Male Hospital Department of the Cook Co. Poor-house.

Suicidal tendencies, as is well known, are frequently manifested by the insane, and the most difficult and painful modes are often adopted when easier and more direct means to terminate life are usually at hand. The following case while illustrating this point also presents various interesting features as a surgical case.

Suicide by cutting through chest walls. About 2 o'clock A.M., Oct. 20, 1876, I was called by the night-watchman to see Mr. C., who, he informed me, was bleeding profusely. On entering the room found the bedclothes saturated with blood, also considerable blood on floor and walls. The patient was lying quietly in bed muttering incoherently. On the left side of his

chest I found an incised wound about six inches in length directly over the body of the sixth rib, from which blood was freely escaping. The finger used in exploring the wound passed very readily to the surface of the rib, which could be plainly felt or seen by separating the flaps, but as the blood appeared to come from the bottom of the wound, passed the finger along the upper border of the rib when a second incision was found fully two inches in length, extending through the entire chest walls and communicating with the left pleural cavity. The patient was greatly exsanguinated and appeared completely exhausted. When asked his reason for injuring himself, he answered that he meant to expose his heart to view, to demonstrate how pure it was. Had the incision extended a little more toward the median line of the body, he might have penetrated the pericardial sac and really exposed his heart to view. The instrument with which he inflicted the wound was a small piece of glass which he obtained by breaking a window pane.

Cutting through the entire thickness of the chest walls with a small piece of glass must have necessitated a large number of small incisions which only the fixed determination of a madman could have inflicted upon self. The treatment consisted in stitching the wound after all hemorrhage ceased, and applying strips of adhesive plaster to exclude the air from the pleural cavity and facilitate union by first intention. The wound at first commenced to heal kindly, but gangrene of the toes on both feet followed from apparently insufficiency of the blood supply to parts so distant from the heart. The patient died on the twelfth day after the injury.

For the histories of the two following cases, I am indebted to Dr. Richard Dewey, Supt., State Insane Hospital, Kankakee. The first case was under his care while assistant physician of the asylum at Elgin. The second case is taken from his notes, and happened in one of the eastern hospitals for insane:

1. A female patient, victim of melancholia and hallucinations, who had made an effort to commit suicide by drowning previous to her admission to the asylum, believed herself the object of a conspiracy to be abducted at night and thrown naked into a pit to perish. Imagining one night that she heard her ab-

ductors approaching, she cut several incisions in her abdominal walls with a pair of rusty scissors she had in some unknown manner obtained possession of and secreted about her person. The incisions were from one to three inches in depth, and from one to four inches in length. Fortunately, the adipose tissue was very thick, so that the incisions escaped the peritoneal lining. The wounds united with the aid of a few sutures. This patient was subject to frequent frenzied paroxysms of fear, and yet conducted herself with dignity and conversed so intelligently in the intervals, that she strongly impressed a legal gentleman, with whom she had an interview, that she was unjustly confined.

2. A female patient with hallucinations very similar to those of the previous patient, who also cut in her abdominal walls with a pair of scissors. In this instance the wounds were more serious in character, the scissors penetrating the peritoneal cavity and dividing the small intestines in several places. The patient died from the injuries sustained.

Self-inflicted injuries are by no means uncommon among the insane. At the present writing there are three patients in this asylum who repeatedly cut themselves about the head, face and chest, with pieces of glass, scraps of tin, or any substance sufficiently hard to penetrate the integument. F. B., a valuable female patient to do general work about the asylum, is never free from cuts about the head and face. D. S. is keeping an old bullet wound in the leg discharging by filling it with irritating foreign bodies and pounding the leg. J. M. scarifies his entire chest with a piece of glass. This patient also pierces his ears and hands with pins, frequently passing needles completely through the hand.

Another class of more serious self-inflicted injuries is occasionally met with in asylum practice. The following case is reported as an example :

W. C., an intelligent traveling agent, was admitted to the asylum November, 1878, suffering with general paresis. The case followed the usual course run by similar cases, until several weeks prior to his death, when he commenced to break out his teeth by biting some solid body and tearing the teeth from their sockets.

In this manner he extracted every tooth in both jaws as far back as the first or second molars. Several days previous to his death he fractured his inferior maxilla in two places in the same manner that he extracted the teeth. With the hæmatoma auris unusually well marked in both ears, toothless, with a double fracture of the jaw, and with ecchymoses and swellings about the forehead, cheeks and prominent points of the face, the patient presented as repulsive a physiognomy as could well be imagined.

Three patients have made unsuccessful efforts to commit suicide by cutting their throats. In two instances the incisions extended directly across the anterior surface of the throat, both cutting into the trachea, but as no important arteries were divided, they made rapid and complete recoveries. The third case was more serious in character, as will be seen by the following history :

R. C. attempted to commit suicide by cutting his throat with a sharpened table knife. He made three incisions, extending from below the left ear, terminating in a common incision at the upper border of the cricoid cartilage, and extending directly across the throat, cutting through the anterior surface of the trachea.

The hemorrhage was very profuse, the patient bleeding to syncope before it could be arrested. He made a very slow recovery, and remained in about the same mental condition until October 27, 1880, when he made a successful effort to commit suicide by hanging himself. He was found, by an attendant who unlocked his room, suspended from an iron bedstead stood up on end, with both feet resting on the floor.

The following history of a patient admitted to the State Asylum at Kankakee was kindly furnished me by Dr. H. N. Moyer, assistant physician :

G. G., admitted February 16, 1880, had made an unsuccessful effort to commit suicide by cutting his throat eight days previous to his admission. The incision extended along the upper border of the thyroid cartilage, and two-thirds through the larynx. He also stabbed himself in the neck, evidently thrusting the point

of knife to the bodies of the vertebræ, causing two wounds of the œsophagus, through which liquid food escaped. An attempt had been made previous to his admission to secure apposition of edges of wound by common twine sutures, which had been drawn through the edges of wound by the struggles of the patient.

He labored under that form of acute melancholia in which every effort at interference is resisted to the last degree. He abstained from all food, so that it became necessary to feed him with a stomach tube, a delicate operation, as great care had to be exercised to prevent further injury to the parts. Fully one-half of the hyoid bone necrosed and came away while the wound was healing. The wound healed by granulation. The chief points of interest in the case are: The difficulty encountered in the treatment, the mechanical feeding, the necrosis of hyoid bone, and the complete recovery.

HOMICIDAL TENDENCIES.

Homicidal tendencies are not infrequently manifested by the insane. Aside from several fractures of the extremities and other minor injuries, two patients at least have died from the effect of injuries received at the hands of fellow-patients.

One sustained a fracture of the skull with depression of bone. The skull was trephined and the depressed bone elevated, but he died shortly afterward, probably from the effects of other internal injuries he sustained.*

The other patient did not sustain any fractures, but was so severely bruised about the head, face and body by his room-mate that he died on the fifth day.

M. M., an attendant, quite recently received a severe cut about the mouth and lips with a triangular piece of glass in the hand of an epileptic patient. The wound extended along the inner surface of the cheek from opposite the second molar tooth to the median line of the face, and then completely dividing the lip, to the lower border of the inferior maxillary bone, dividing the inferior coronary and inferior labial branches of the facial artery. The hemorrhage was profuse, bleeding *per saltum* from the di-

* This case was related to me by Dr. G. P. Cunningham, former superintendent of this asylum.

vided arteries in both flaps of the wound, and also from the bottom of the wound in the mouth. The inferior labial was divided very close to its junction with the facial, and could not be ligated in the mouth. The hemorrhage from this vessel was arrested by passing with a needle a ligature through the cheek and under the artery. The wound healed throughout by first intention.

To illustrate the difficulties sometimes encountered in surgical practice among the insane, I report the following case of Pott's fracture of the fibula :

G. P., while quarreling with a fellow-patient, sustained a Pott's fracture of the fibula. A Dupuytren's splint was selected in dressing the fracture. On making the usual rounds the next morning, found the patient sitting on the edge of his bed, with the splint securely fastened to the window grating. Thinking that he would be unable to remove a plaster of Paris dressing one was applied, but here we were mistaken, and the next morning again found him sitting on the edge of the bed and the plaster dressing also securely fastened to the window grating. Adhesive plaster dressings were removed as fast as applied ; strait-jackets and other modes of restraint were useless, as he would twist and turn, doing more injury to the leg than any surgical dressings could possibly counterbalance. All surgical appliances were discontinued, and our efforts directed to gain as good a position of foot as possible by frequent manual manipulations. The result was in every respect satisfactory, as the patient was able to bear his weight on the foot at the end of four weeks. While in a simple fracture of the fibula surgical dressings may be dispensed with,* what would be the result in a case of compound comminuted fracture involving both bones of the leg ?

FOREIGN BODIES.

Foreign bodies in the larynx, pharynx and œsophagus are occasionally met with, as a large number of demented patients swallow their food almost entirely without mastication. I have seen but two cases of foreign bodies in the pharynx, and none in the larynx or œsophagus requiring surgical interference.

* A case presenting great difficulties in the treatment was related to me by Dr. E. A. Kilbourne, Superintendent, State Hospital for Insane, Elgin, Ill.

1. Mrs. C. swallowed a sharp, irregular piece of bone in her soup, which was arrested in the pharynx and held very tightly by the spasmodic contraction of the constrictor muscles, preventing its removal without injuring the surrounding tissues. During a severe paroxysm of vomiting the tissues relaxed and the bone was removed through the mouth, but not without considerable injury to the mucous lining of the pharynx, the patient expectorating sputa streaked with blood for several days.

2. C. S., a hemiplegic patient, managed to partially swallow an enormous piece of meat, which lodged in the lower part of the pharynx and could not be moved up or down. Respiration was interfered with, by pressure against the larynx and pharynx, to such an extent that the patient was struggling violently for breath, his face congested and the veins of neck greatly distended. The operation of tracheotomy was contemplated to gain time, when, during a convulsion resembling an epileptic fit, the foreign body was expelled spontaneously, and all the alarming symptoms at once disappeared.

Of foreign bodies introduced into the other openings of the body, the rectum, urethra, nose and auditory canal, I have never seen any examples except in the auditory canal. Tampering with the ears by patients who have hallucinations of hearing is quite common, and how some of these apparently slight injuries lead to fatal terminations will be seen by the following case :

L. F., female, aged about thirty-five years, suffering from chronic mania, imagined that she was persecuted by "spiritual enemies," who were constantly using the most insulting language in her presence. To exclude these sounds she kept her ears firmly plugged with cotton, but as the precaution failed to remove the dreadful sounds, she filled the left auditory canal with some lye she managed one day to secrete about her person. The contractions of the tissues which accompanied the healing process resulted in a complete closure of the meatus auditorius externus. She enjoyed her average health for several years, and died very suddenly April 24, 1880. A *post-mortem* examination held fifteen hours after death, revealed the following pathological conditions : The cerebral meninges, especially dura mater, greatly thickened over the lower surface of the left middle cerebral lobe ; consider-

able blood was found in left middle cerebral fossa, which had escaped from the left superior petrosal sinus. The entire petrous portion of bone was honey-combed and much softer than natural, and a considerable quantity of yellowish matter, resembling pus, had collected on the anterior surface of the petrous portion of the temporal bone. The bone was so soft as to be readily cut with a cartilage knife. Upon removing a shell of bone the entire auditory canal and tympanum were found distended with sebaceous matter and pus. The hemorrhage was regarded as the immediate cause of death, but there can be no question that the hemorrhage was a result of the ulcerative process extending through the coverings of the petrosal sinus. The probable pathological history of the case was somewhat as follows: The closure of the auditory meatus preventing the escape of sebaceous matter caused a gradual accumulation to take place, until the auditory canal was entirely filled; ulceration through the membrana tympani followed, affording temporary relief until the tympanum also was distended, and the surrounding bone underwent disintegration and absorption as a result of the pressure caused by the accumulated matter. The inflammation extending to the meninges of the brain caused the hypertrophy of these tissues, while the rupture of the diseased coats of the superior petrosal sinus (the source of the hemorrhage) was the immediate cause of death. A timely operation, opening the meatus externus and removing the accumulated sebaceous matter, would no doubt have resulted in a complete cure.

SUBOCCIPITAL ABSCESS CURED BY REST.

O. B., German, aged 35, was admitted April 22, 1880. Upon examination found him anæmic and neurasthenic, with a small erysipelatous swelling over left anterior parietal region, following a blow on the head with a policeman's club. The erysipelas spread very rapidly, soon involving the entire scalp. The presence of pus was detected on the sixth day, when several incisions were made and considerable pus discharged. A five-grain solution of carbolic acid was injected once daily. The entire scalp appeared as if completely loosened from the skull, so that water injected through an opening in the left temporal region escaped through an opening in right temporal region, and *vice versa*. This treatment was followed without any apparent improvement until May 27th, a full month, when a roller bandage was applied, passing firmly over the occipital and frontal portions of the occipito-frontalis muscle, preventing all movement of the scalp.

The discharge at once diminished in quantity and ceased altogether in a few days, the abscess healing completely in two weeks by simply putting the diseased parts at rest. *

My attention was recently called by Dr. Hoyt to a very interesting case of a large ulcer on forehead, which gradually increased in size under the use of various lotions and salves, but commenced at once to heal after he applied long strips of adhesive plaster and kept the parts at rest.

OBSTETRICS UNDER DIFFICULTIES.

Confinements in asylums are very infrequent, and generally against the laws governing such institutions, but what such cases lack in frequency they sometimes make up for in interest and the difficulties they present to the obstetrician. As most cases of puerperal insanity follow delivery, and the class of insane patients that become pregnant usually suffer from the milder types of insanity, a delivery in a patient laboring under acute mania may prove of interest.

Mrs. C. was admitted to this asylum, pregnant, with all the symptoms of acute mania marked. She remained in about the same mental condition for several weeks, when labor set in. Unfortunately, she imagined that she was about to be executed for committing some imaginary crime, so she made every effort in her power to avoid being examined, using her hands, feet and teeth to keep every one at a safe distance. At the commencement of each pain she would jump out of bed and try to escape from the room. During the first stage of labor she was allowed to indulge in these freaks, but when the second stage set in it was deemed necessary to have her at least remain in bed. A strait-jacket was applied, but even then she was almost unmanageable, with an attendant holding her head, while two attempted to perform that duty for her inferior extremities.

PERINEAL ABSCESS AND GANGRENE OF SCROTUM.

This case is reported as affording a good example of the rapidity with which extensive destruction of scrotal tissue is repaired.

* A very interesting similar case is reported by Mr. Hilton, page 79 of his work on "Rest and Pain."

T. T., aged 42, suffering for many years with facial neuralgia, presented himself at the out-department of the Cook County Poor-house October 4, 1880, complaining of severe pain in the scrotum and testes.

Upon examination, found perineum hard and swollen, with erysipelas involving the entire scrotum. He was transferred to the hospital department, and hot water dressings were ordered to be applied continuously.

October 5th.—Scrotum swollen to twice its normal size, and erysipelas extending over lower part of abdomen. The penis is greatly distended, with effusion under integument. Hot-water dressings continued, and the following preparation prescribed :

R

Quinæ sulphatis, 4.

Tinct. ferri chloridi, 8.

Syr. tolutani,

Aquæ puræ, āā 30. ℥

Sig. Teaspoonful three times a day.

Opium in sufficient quantities to relieve pain.

October 6th.—The erysipelas extending higher over abdomen. Scrotum enlarged to the size of foetal head. The swelling on perineum enlarging and very painful. No fluctuation can be detected.

October 7th.—The case was seen to-day by Drs. Wilde, Cohen, Bessler and Thiely, of Chicago, who advised a continuation of the treatment adopted, and expressed an unfavorable prognosis, as all the symptoms present pointed to extensive destruction of scrotal tissue and death from exhaustion or septicæmia. Opening the perineal abscess as soon as the pus approached the surface was recommended.

October 8th.—About 5 o'clock this A.M. the abscess opened spontaneously near the centre of the perineum, discharging a large quantity of poorly-conditioned, offensive pus.

October 10th.—Circulation in anterior surface of scrotum entirely arrested. Urine escaping through opening in perineum, an elastic catheter was passed into the bladder without difficulty.

October 14th.—Line of demarcation commencing to form, the mortification involving greater part of anterior surface and base of scrotum. Carbolyzed linseed poultices were now applied instead of hot-water dressings ; the slough at once commenced to separate,

and was completely removed by the 19th, when nearly half of the scrotal tissue was gone, both testicles being plainly exposed to view, the left protruding partially through the opening. After pressing the testicle upward, applied strips of adhesive plaster, bringing together the opposite sides of the wound, and affording support to the testicles.

October 24th.—Adhesive straps have been applied daily since the 19th ; opening about one-half of former size. Opening in perineum almost closed. Patient can retain urine for several hours, and but little escapes through opening in perineum.

October 30th.—Healing very rapidly, the opposite sides of the wound remaining in contact without strapping ; testicles in normal position.

November 15th.—Wound healed, and patient discharged cured in less than a month after the destruction of nearly half of the scrotal tissue.

THE TOWN OF GHEEL, IN BELGIUM, AND ITS INSANE ;

OR, OCCUPATION AND REASONABLE LIBERTY FOR LUNATICS.*

By W. J. MORTON, M.D.,

NEW YORK.

“ Il n'est muraille que de os.” The inhabitants themselves are the best walls.—Rabelais.

THE Gheel of to-day can be understood only by knowing the Gheel of the past. In its essential principle of freedom for the insane, Gheel has never changed. What it was one hundred or five hundred years ago it is now. The kindly nature, the inherited instincts, the tact and the practicality of the inhabitants, have ever been the only walls which have encompassed its colony of insane, numbering many hundreds. Lunatics wander at will through the streets and mingle in the daily routine of the home life, enjoying the same privileges apparently as citizens enjoy.

And this has been the case for centuries. In a historical retrospect, then, we shall find the key-note to the “Gheel idea” carried out even now in our own times.

In the seventh century, so the legend runs, a certain Dymphna, daughter of an Irish king, having enraged her father by adopting the Christian faith, fled from his vengeance to the then far-away land of Belgium. There, in the

* Read at a meeting of the the New York Neurological Society, January 4, 1881.

little hamlet of Gheel, she, together with the priest Gerebernus, sought and found refuge with a band of Christian brothers who had collected in this remote corner, and had erected in the solitude a little chapel dedicated to St. Martin, an English missionary. But Dymphna's father, with a band of retainers, followed, and, as the quaint language reads, "devoured by an ungovernable rage," beheaded her. In a little shrine at Gheel, set deep into a wall on the corner of the main street in the town, we may see, carved in wood and of life size, a group of figures vividly calling this scene to mind. The daughter on her knees awaits the stroke, the father stands with upraised sword, while just behind and waiting to receive him, the devil, with veritable hoof, tail and horns, and painted ebony black, is rising up from out a cleft in the ground.

Many miraculous incidents attended the maiden's death, and hence she became St. Dymphna, the patroness of all who prayed to be delivered from insensate acts;* or, if we follow another line of tradition, a number of insane who were witnesses of the young Christian's murder, were suddenly and miraculously cured of their malady, and hence St. Dymphna was considered to have the power of curing those who had a mental disorder.

Here, springing from out the mists of the seventh century, is all we shall probably ever know of the origin of this most famous colony of the insane in the world,—a colony which has ever shone and still shines a beacon light to all progress toward a humane treatment of mental alienation.

Be the facts concerning the Irish king's daughter as they

* "However sad may be one's state, the name of St. Dymphna has never been invoked in vain; but since she courageously resisted and vanquished the insensate love and fury of her father, she has been established by God as a special patroness against every species of madness; moreover, the miracles performed at Gheel in the cure of the insane have made this fact sufficiently well known." Translated from *Legende der Martelaren van Gheel* SS. Dimphna en Gerebernus. Antwerpen, 1860. pp. 66. Exercises of devotion at present in use in the Church of St. Dymphna.

may, certain it is, from existing records, that in the eleventh and twelfth centuries crowds of insane were conducted by their friends to the shrine of St. Dymphna, where they remained days and months awaiting the result of the pious intercessions made in their behalf. The principal curative measure was the *neuvaine* or nine days' prayer, during which the priests, singly and in procession, solemnly proceeded to exorcise the demon which was supposed to possess the unfortunate madfolk.

In 1340 was completed a beautiful church commemorative of St. Dymphna and the incidents of her death, and erected on the site where formerly stood the little chapel of St. Martin. Here Dymphna's bones and many relics were guarded in state and conveniently arranged for pilgrims to pray before, while votive tablets set in the walls bespoke the numerous miraculous cures effected. Chapels, shrines and crosses marked other historical spots in the town ; in short, no effort seems to have been spared to foster the tradition which brought inhabitants to the place, money to the tradespeople, and both fame and money to the ecclesiastics. Against one side of the church, and directly connected with it, was built a two-storied building, divided into strong cells, in which to this day may be seen the iron rings in the walls and the chains by which many of the insane were confined during the continuance of the nine days' religious ceremony alluded to.

When at last these cells would hold no more it became the custom to quarter the natural overflow in the neighbors' houses, or when the cases were of a mild nature to leave them at Gheel for further prayers. From the seventh century, probably, or from the twelfth century with certainty, counting from 1340, the date of the completion of the Church of St. Dymphna, up to 1850, the insane were in the charge and under the control of the inhabitants of Gheel.

Villager and priest divided their care and cure between them,—the one in the home life, the other at the altar, while the laws and regulations for their treatment and protection were enacted by the local authorities.

At the beginning of the present century there were about 400 insane at Gheel. The wave of reform on the continent, started by Pinèl in 1792, found no dungeons or restrictions for harmless insane in Gheel, and passed over it without commotion. Gheel was then even, certainly in its treatment of the chronic insane, far in advance of the best results which have yet followed the efforts of the wise and humane Pinèl on the continent, Conolly in England, and their followers elsewhere. Thus Gheel thrived, isolated, obscure, and unconsciously superior; and it was only in 1850 that, in common with all the institutions for the insane in Belgium, Gheel became subject to central governmental control. The new regulations of 1850 provided for medical service. It is a notable and curious fact that up to this comparatively very recent date the insane of the town had never been under any organized medical care. The family life and the *neuvaine* for the restoration of reason were the predominant principles involved, and even now these two elements retain much of their former importance.

We now see how spontaneously has sprung up the "family system," that curious domestic mixture of the sane and the insane that has made Gheel a wonder and an anomaly. And no less natural and spontaneous were the further steps (*a*) of liberty to the insane person of wandering about the town at will with merely that general supervision of parent to child; (*b*) of responsibility of each family for the one or two patients in their charge; (*c*) of participation of the insane person, as far as his mental and physical strength allowed, in the general affairs of the household and farm; and finally, (*d*) of the growth of that curious sentiment in

the breasts of the villagers which causes them to regard the care of the insane in much the same light as a mother regards the care of a child.

The Gheel of to-day, then, is the product of tradition, superstition, religion, and long custom, into which have been grafted only within thirty years a medical service and certain restrictions as to the non-reception of furious and dangerous patients. Gheel was not born fully equipped for its work as it now is—it grew. What in the middle ages and earlier was a sequence to religious observances, developed later into a permanent method of taking care of the insane. What at first was accidental became an established institution, owing little in its main elements to modern additions.

With this historical preface in hand, I am sure that my readers will accompany me in a visit to Gheel, more understandingly, and with more brevity of description on my part, than would otherwise have been possible.

It was a long pilgrimage to Gheel in the old time to invoke the aid of St. Dymphna. To-day patient or visitor steps into the train at Antwerp and reaches Gheel in an hour.

During the last summer I visited Gheel twice. Some years ago it was necessary to take a somewhat tiresome journey by diligence, but a railroad now passes the town. The train, as on all Belgian roads, glides across the country smoothly and noiselessly as compared with our American lines. The first part of the way is over a flat and fertile land, along which are scattered at irregular intervals little hamlets, one much like another, with its low one-storied houses, thatched and covered with red tiles. Long rows of tall and slender poplars stretched off to great distances and marked the position of narrow lanes or equally narrow and paved highways. The ground is cut into sections by varieties of tillage, but no fences are to be seen. Every scrap of

land is cultivated. Here and there a windmill and herds of Dutch cattle completed the lowland picture. Peasants, men and women alike, were in the fields at work in the fresh morning air. But the aspect of the country changes after the first half of the way is travelled. Stretches of land and gravelly knolls replace the garden lands. Beech and pine and oak appear instead of the poplar. One wonders how St. Dymphna found her way into this uninviting country.

Upon arriving at the station on my last visit, the station-master provided a brisk little Flamand lad to act as guide, for it was necessary to find a hotel, as well also as the distinguished medical director of the colony, Dr. Peeters, to whom I had letters of introduction.

In some way I had formed the impression that Gheel was a rustic village, but on the contrary, I found a large town, with long and paved streets and well-built and solid houses, in many instances one against the other, as in cities, or built on small plots of ground with garden in front and rear. There was no bustle, neither was there silence. Things appeared much as elsewhere in towns—here and there a passer by—here or there a wagon or two-wheeled cart. Where, then, were the lunatics? Nothing at first sight betrayed their presence. I put this question to my guide, who replied, "Oh, we shall meet them everywhere." We were then passing the large church of St. Amand. "There," he said, "on the steps beneath the shade of the church, is one, tending a baby." I walked up to a healthy-looking young woman, who was carefully holding a chubby child, perhaps eight months old. "I am the Saint Virgin," she said, in answer to my inquiries. "This is Julie's child, who lives around the corner." Julie, it seems, was the nourricière or guardian with whom this patient was placed.

Later I found that it was not at all uncommon to trust children to the care of the patients, and no accident has

ever happened. Speaking of this incident to Julie, the mother of the child, she said: "Ah, but I wouldn't let this woman (her second patient, for most families have two) tend the children." Long acquaintance with the insane, and the results of generations of inherited devotion to their care, make clever alienists of the Gheelites, it seems.

Still on our way to the hotel we met a very polite young gentleman sauntering along, smoking his pipe and listening to a hand-organ. "Good morning," I ventured; "Good morning," he replied graciously. "You find Gheel very agreeable?" I continued. "Oh, yes," he said. "I am here on a visit learning the Flamand language; I am a gentleman of leisure." A little further along a woman stood with her face to the wall of a house, talking to herself, with many gestures; people passed and repassed without seeming to be aware of her presence or her acts.

An idiot boy came hurrying along with meat in a butcher's basket on his arm. It seems he lived with a butcher.

It was quite true, as my little guide had said, we could meet the insane everywhere; but as nobody paid any special attention to them it required some little care to pick them out from the sane. However, I had seen enough to satisfy me that I had arrived in the capital city of the insane, and I hastened my steps involuntarily to begin a nearer examination of its peculiarities. From the little hotel of "Het Lamb" to the infirmary where resided Dr. Peeters, the medical director of the colony, the way was short. Dr. Peeters has always a cordial welcome for all students of the Gheel system. On the register in his office were the names of many alienists known to fame, particularly from England, and in his library were shelves of books upon the subject of Gheel alone. Under his guidance I at once proceeded to examine the "Gheel system."

GHEEL.

Gheel is a commune in Belgium, situated about twenty-four miles to the northwest of Antwerp. Its inhabitants are Flamands, made up of an early mixture of Germans and Gauls. It has no special industry, but the population is principally occupied in agricultural pursuits, domestic lace-making, and caring for the insane. Frugal and industrious, their wants are few, their lives calm. While there are few rich, neither are there many poor. Too practical to be far behind the times, Gheel is at the same time too isolated to be stirred with much of the world's bustle.

The inhabitants are almost entirely centered in the large town of Gheel, though a certain number are scattered in the outlying hamlets situated within a radius perhaps of a mile. Most of the farm-hands among the insane live at these hamlets. The population is 12,000, and there are about 2,000 domiciles of which nearly 1,000 receive insane patients.

The insane population of the town is steadily increasing. In 1868, it was 1,035; in 1869, 1,072; in 1870, 1,095; in 1871, 1,127; in 1873, 1,230; in 1874, 1,272; in 1876, 1,383; and finally in this year, 1880, about 1,600. Of this latter number about 1,400 are Belgian; the rest are Hollanders, Germans, French and English. Of the total, about two hundred are paying patients; the rest are paupers.

In general all classes of insane are received at Gheel excepting such as require continual restraint, or those who are suicidal, homicidal, or incendiary. The discretionary power as to what patient may be rejected as an unfit subject for residence in the town is lodged with the medical inspector.

We have already traced the birth of the "Gheel idea" into the far past, and commented upon its religious origin, and we have noted also that its organized medical service was of very recent date—only so late as 1851.

This new medical service formed but a small part of a grand alteration in the internal management of the commune, as regards its insane, initiated in 1850 upon the recommendation of a commission* which had been appointed in 1841 to examine into the condition of all the Belgian establishments for the insane. The royal decree of 1850, and a special decree regarding Gheel in 1851, placed Gheel in common with all the other establishments under central government control. These decrees provided not only for a medical service, but what is important to note, this service was to be entirely distinct from the general administration and subordinate to it.

ADMINISTRATION.

The administration rests in the hands of a "superior commission," composed 1st, of the governor of the province, or his delegate; 2d, of the attorney-general; 3d, of the judge of the canton; 4th, of a physician appointed by the government; 5th, of the burgomaster of the commune; and 6th, of five members nominated annually by the minister of justice.

Added to this commission is a secretary, at a salary of 550 francs per annum, whose functions are extensive and important. He makes the reports, conducts the correspondence, has charge of all that concerns the receiving of money from the friends of patients or authorities, and the disbursing of these funds to the village nourriciers, has charge of the books and is steward to the central infirmary. He is of course a resident of the town. Other communes or asylums having twenty-five or more patients at Gheel may be represented in the commission by a delegate. The medical inspector may also be present, having, however, only a consulting voice.

* Appointed in 1841 by the Belgian Government to examine the condition of the insane in Belgium. The report of M. Ducpétiaux, inspector-general of prisons and charitable institutions, formed the basis of the present laws in force at Gheel regarding the insane.

The commission meets once each three months at Gheel, and makes a general inspection of all the branches and all the details relating to the care of the insane, making, after each visit a report to the Minister of Justice upon the condition of the town, as well as annually a more complete report in which it points out necessary ameliorations and reforms. It also decides upon the list of *nourriciers* authorized to receive the insane.

The real working portion of this commission, however, is its "permanent committee," composed of the five members and citizens already referred to, and presided over by the burgomaster or mayor. Its meetings are held once a week. Its special office is to place the patients in their village homes, consulting at the same time the medical inspector or the section physicians. It furthermore receives and expends, through its secretary, the money for the support of the insane, watches over their interests, keeps an eye upon the *nourriciers* and the hosts, and sees that the laws and regulations are carried out.

The secretary must visit daily some portion or another of the colony and make a monthly report to the committee.

NOURRICIERS AND HOSTS.

As we have said those villagers who wish to receive the insane into their families must be registered on the list authorized by the permanent committee. Those who receive paying patients are termed hosts; those who receive paupers are termed *nourriciers* or nurses. Both are required to furnish evidence of good moral character, of attention to their duties, healthy and abundant food and sufficient room for the patients they are to receive. No host or *nourricier* is permitted to receive more than two patients. I found in no house in Gheel more than this number under a single roof.

The *nourricier* or host has the special guardianship and

direct surveillance of the insane patient placed in his care, and is moreover responsible for any damage which his charge may commit. If his patient escapes, the expense of his capture and return must be defrayed by him.

A multitude of minor regulations prescribe the amount and character of food supplied, the size of the rooms occupied, the ventilation, the single occupancy of a room, the covering on the floor, the articles of bed furniture, and the clothing.

Lastly, the insane thus placed with a host or *nourricier* may be employed in work that is suitable to their strength and abilities, or in occupations which serve to engage their attention, without in any case, however, being overworked or wearied. This permission may be withdrawn at any moment if the privilege it accords is abused. Care is taken to place patients in families corresponding to their former condition in life,—some with the peasants on the farms, some with mechanics, others with the small shop people or well-to-do residents. With rich and poor alike at Gheel it is an honor and a duty to have at least one patient in charge.

As a further protection to the interests of the insane there are four "section guards;" one at the infirmary, and the other three in charge, respectively, of the three sections into which the town is divided. Their duties are to walk about their sections continually, enter houses unexpectedly, see that the patient is not overworked, observe his mental condition, and make a daily report to the medical inspector or to a section physician.

MEDICAL SERVICE.

The medical service of Gheel is under the charge of a medical inspector. At present this office is held by the very earnest and able Dr. Peeters, who is efficiently carrying out the methods pursued by Dr. Bulkens, his only predecessor, now deceased.

Dr. Peeters' headquarters are at the infirmary, and owing to the careful regulations which provide, in the person of the secretary of the superior commission, for a steward or business manager who shall look after the money affairs, food, bedding, washing, lighting, fuel, etc., he is able to give his time strictly to the pursuit of medical subjects.

He is aided by three physicians, who have charge of three separate sections into which, for convenience of attendance, the town is divided. These physicians reside in their sections and are engaged in the general practice of medicine in the town. Each section physician visits the curable patients in his district at least once a week, the incurables once a month, and additionally whenever he is summoned by those having the patient in charge. He makes a monthly report to the medical inspector who, in time, makes his report to the superior commission. His prescriptions are filled at a fixed rate by pharmacutists living in the same district.

The physician's visit is entered in a book kept by the *nourricier* or host.

I examined many of these books in making my rounds of the town, and believe that the medical treatment of the insane is admirably organized and carried out.

The medical inspector himself must visit patients if asked to do so, and must, in any event, have visited every patient in the commune at least twice in the year.

THE INFIRMARY.

The infirmary, erected soon after the decrees of 1850, is a fine building which, in the main features of its construction, does not differ from the usual plan of closed asylums, and it is not, therefore, necessary to describe it. The object for which it was built and for which it is now used is, however, vastly different from that of the usual asylum. It is, as its name indicates, an infirmary or hospital. It is

not the centre around which a colony is located ; it is simply an adjunct. Its purpose is to afford the usual hospital treatment to patients attacked with incidental diseases, to care for the very infirm, and to take a brief charge of cases that suddenly develop a condition of excitement which requires, for short periods, continuous and special watchfulness and restraint.

The patients' stay in the building is expected to be temporary.

The general management of the infirmary is under the control, first, of the permanent committee, whose secretary is at the same time the steward ; and second, of the medical inspector. Here, then, we have at once a medical officer and a lay officer or business manager, who together perform the duties which in our American system of asylum management are vested in a single person, viz., the superintendent.

On the occasion of my last visit there were sixteen women and twenty-one men out of a total of 1603 in the town, at the infirmary. There was no restraint employed with these patients, beyond the fact that they were not allowed to leave the court yard and the building. A half dozen "sisters" from a special order, called Norbertines, act as nurses.

THE INSANE IN THEIR HOMES.

Furnished by Dr. Peeters with a section guard who spoke French (most of the villagers speak Flemish), I started out to spend the day in looking about the town. I have already alluded to meeting patients about the streets pursuing various avocations or simply strolling about. This experience became too common finally to attract much attention. It is evident from what I have previously said that this liberty, at first sight apparently almost unbounded, is hedged round by carefully considered restrictions, and that the security of the inhabitants, apparently imperilled, is equally

secured by systematic care and watchfulness. Not only is each patient cared for by his own particular village guardian, but additionally the whole community coöperatively act as voluntary guardians, not only to themselves against improper acts of the insane, but also to the insane person himself against maltreatment by any single household. In a community where nothing is concealed, abuses are not likely to thrive. Public opinion and open dealing are the patients' safeguards. And to this traditional relation between villager and patient we must add the surveillance guided by careful legal enactments and conducted by regularly appointed officers.

In the face of such facts, a superintendent of an American insane asylum,* who is among the very few American medical visitors to Gheel besides myself who has written anything upon the subject, thus sums up his views upon this point. "A few of the manifest defects of the system are the absence of medical care," * * * * "and the almost unlimited opportunity for the abuse of patients," etc., etc. Abuse of patients is simply impossible at Gheel, while from a therapeutic point of view, the retreat to the infirmary, the medical inspector and the section physicians adequately supply all the treatment necessary. It must be remembered that since the duties of these physicians are simply medical, they find, as I have already remarked, more time at their disposal than is possible in our mixed system where the superintendent is also business manager and steward.

Moreover, the "free air," the home life, the household occupations or employment on the farms, are more than an offset for the rules, discipline, military order or enforced inactivity of the best-equipped closed asylum in the world.

* In a pamphlet entitled "The Insane Colony at Gheel," by A. M. Shew, M. D., Superintendent, Hospital for the Insane, Middletown, Conn. Reprinted from the *American Jour. of Insanity*, for July, 1879.

If the question between the Gheel system and a closed asylum were one of comparison of the best methods of curing insanity by early treatment, the question of a hospital treatment would be an important one. But this is not the case.

It is simply a question in Dr. Shew's criticism between the curative effects of the ordinary American asylum, used as a place of custody or simple residence for the most part, as compared on the other hand with Gheel. I have no doubts from this point of view that the prospects of recovery for the patient at Gheel are vastly superior to the prospect in the closed asylums of any country.

A peculiar classification of the insane, which serves as a basis upon which payment is made to the nourricier or guardian, exists at Gheel.

This classification, as ludicrous as unscientific, seems to have had its origin in the simple sense of the people, who measured their services by the amount of trouble occasioned them in keeping their charges clean. The insane are divided into, 1st, the "dirty;" 2d, the "half-dirty," and, 3d, the "clean." *

For the first class is paid about 19 cents a day; for the second, about 18 cents a day, and for the third, about 16 cents a day.

It is somewhat curious to see how this sum is distributed. It is, in the case of the clean, as follows: $1\frac{4}{5}$ cents for medical service, $\frac{1}{5}$ of a cent for medicine, about 11 cents for food, 2 cents for clothes, $\frac{2}{5}$ of a cent for the bed, $\frac{1}{5}$ of a cent for surveillance, and $\frac{2}{5}$ of a cent for administration. Of the 16 cents, the nourricier receives about 12 cents; for the "half-dirty" he gets 14 cents; for the "dirty," 15 cents.

This daily rate is lower than that existing in any asylum or other institution for the insane in Belgium. It is paid,

* Gateux, semi-gateux, propres.

in the case of the paupers, by their respective communes or by the central government.

Selecting one of the large main streets of the town, my guide and I entered almost every house. We first visited some of the paying patients. In a fine, large, and well-furnished two-storied house had lived an Englishman for eight years. He paid \$600 a year. A French prince, lately arrived, paid the same. In a neighboring house was a Dutch student, with his classics scattered on the table; in another, a rich Dutch farmer. They were cases of chronic insanity, subject to exacerbations, which required great care.

But my interests were rather with the less exceptional cases, and I passed on to the ordinary homes of the village. These, as a rule, are but one story in height, and roofed with tiles. They presented an air of comfort and neatness; if there was no luxury, neither was there squalor; they were simply and usefully furnished, the floors clean, the cupboard full of polished pewter and brass and a modicum of crockery; a Dutch clock and the ever-present crucifix and highly-colored prints of the Virgin and child were the only ornaments. To each house is attached a garden. I carefully inspected in every house the rooms in which the patients slept, for I had read that "the sleeping accommodations are often provided in garrets, lofts, and out-of-the-way nooks and corners."* In every instance the sleeping-room was as provided by law, with at least a surface of 6 metres square and provided with a window. It was clean, and contained a good bed.

A little book kept by each *nourricier* gave the record of the name, age, etc., of the patient, the garments received from the infirmary, the number of visits made by the section physician and the medical inspector, as well as notes on special acts of boarders.

* Dr. A. M. Shew. *Op. cit.*, p. 5.

A few instances of households, just as I found them, will answer for samples of all in the town. There are two patients, it will be remembered, in each.

In the first was an old woman, industriously engaged in peeling potatoes. She had lived with the same family for 40 years. The other boarder sat at the front door knitting.

In a second house a strong and healthy-looking woman sat preparing turnips for boiling, while her companion lunatic was engaged in general housework.

In a third house one again was knitting; the other could not be induced to work; her principal occupation was to tear things.

In a fourth house was a middle-aged woman tending the child of her *nourricier*, and a second patient knitting.

In a fifth house one was polishing the stove, and was much amused at being caught with black hands; her companion was useless, and merely sat, refusing to take part in work.

In a sixth house was but one patient, an idiot boy of perhaps 10 years of age. The fine, fresh-looking, and elderly woman who took care of him was as fond of him as if he had been her own child. Though he had epileptic fits and was "dirty," she had his crib drawn up beside her own bed, in order to look more carefully after him during the night.

In a seventh house were two idiots.

In an eighth, occupied by a shoemaker, were two more, who seemed, while taking part in the work, to be of more trouble than assistance.

In a ninth was a case of chronic mania and an epileptic. The woman *nourricier* lived quite alone with these two. The price received for their care, \$73 each, was her only means of support.

In a tenth house were two who would not work or assist in anything. The price paid for each was \$50.

In only one instance did I find a patient in restraint. He was a strong man in charge of a woman by no means masculine, whose husband was in the fields. Finding that her charge was breaking and tearing every object in his reach, she had, with the permission of the section physician, put him in a camisole.

A couple of cases from Dr. Peeters' records* will illustrate very vividly the nature of many others met with :

A patient named Virginia A., number 6746 on the register, had been a year at the asylum Sainté-Anne-les-Courtrai. She entered the infirmary at Gheel on May 14, 1880, and presented at this date all the symptoms of intense mania. She was constantly in movement, ran about the court-yard, and accosted every one. She talked unceasingly and with ease, but what she said was incoherent and confused. She would frequently scream, sing, commit extravagant acts, tear her clothing, or pick the coverings of her bed. She did not sleep at all.

On May 19th the patient was placed in charge of a peasant guardian living in a quiet locality some distance from the town. The instructions were : gentle supervision, protection from all causes of excitement, occupation in household affairs and out-of-doors. At the end of three weeks one would scarcely believe that they beheld the same patient, for she had entirely recovered. Fearing a return of an excitement which had so suddenly disappeared, we did not dare sign a certificate allowing of her departure until the 27th of the month. But the cure remained permanent, and the patient returned to her own home on October 2d.

A patient named Mary V., number 6094 on the register, suffering from delirious melancholy. Energetic moral and other treatment, and the devoted attentions of the "sisters" did not succeed in modifying her condition. She spent the day in lamentation, saw the preparations for the frightful punishment which she believed she would be obliged to suffer, and slept neither day nor night.

* Translated from *Lettres Médicales sur Gheel*, etc., seconde lettre, p. 29, by Dr. J. H. Peeters, Médecin Inspecteur, Sept., 1880.

She was entrusted to an intelligent and devoted *nourricier*, who lived on the farms, with instructions to exercise proper supervision and kindness, to make her life as calm as possible, to provide proper occupation for her, and to look after the regularity of the excretions. Mary V. was scarcely installed in her new home before her condition modified favorably. Her delirium became somewhat less active. She mourned less, and soon took part in the household labor with the wife and daughters of her guardian. Her appetite became excellent, her sleep normal, and she increased in flesh. This improvement developed at the end of four months into a permanent cure. Before leaving, the patient came to thank us, and when I congratulated her on her rapid and complete cure, she replied : "I would never, I believe, have recovered at the infirmary. The presence of the other patients fed my delirium and my unrest. As soon as I had entered into the calm and happy home of *nourricier* G. I felt my senses grow clearer and my heart encouraged."

One is surprised to find that escapes are unfrequent ; they range from seven to twelve annually ; the patient is always quickly caught and returned.

Acts of violence are likewise, compared to the population, very rare. But three instances of the latter are known : one a homicide in 1840 ; the second and third, injuries inflicted by farm implements, and not fatal or indeed in the last instance severe. Three suicides have occurred since 1875, a number not relatively large.

Offences against morality, or the occurrence of pregnancy, are also almost unknown. The "confusion of the sexes," so often urged as an objection to the Gheel system, leads to no unfortunate results. In a half century scarcely a half dozen instances of pregnancy among patients have occurred.*

THE HAMLETS.

Leaving the town by any of its principal thoroughfares, one is, in a twenty minutes' walk, out in the open country. Here in every direction are scattered the farmers' homes in

* *Lettres Médicales sur Gheel*, etc., by Dr. J. H. Peeters, Gheel, 1879.

little clusters of houses, numbering from three to ten. These houses are not as well kept as the houses in town, but I saw no evidences of discomfort. That "the hamlets were low" and sometimes "dark" was sometimes true, sometimes not; also that they were "destitute of wooden floors, and covered with thatched roofs;" this description would apply to the abodes of most of the peasantry on the Continent, but that they were "damp" I did not discover. Most of these houses were divided into four rooms: a kitchen, a sitting-room, and two chambers; on the end was a continuation occupied by the cattle, and connecting by a door into the kitchen. This seemed to me the most unpleasant feature in their construction. But that "all the peasantry had the old worn look that is produced by overwork and underfeeding"* was totally contrary to what I saw.

I have never seen better specimens of fine physical health than among these peasant people, with their bright glowing complexions and rounded figures. Certainly, taken as a whole, they would compare favorably with the generality of peasantry.

There were many idiots scattered among the farmers, many dements, and cases of chronic mania and epilepsy. In case a patient becomes too much excited and unmanageable he is taken to the infirmary. The average price paid here is about \$63 a year. Those who were at work seemed to work willingly.

One saw on every hand evidences of at least complaisant labor on the part of the insane, and kindness toward them on the part of the sane. We would meet, for instance, an insane man wheeling a barrow of potatoes across the field, full of interest in his task, while a peasant woman who was his nourricier followed along after; or again, a peasant

* Dr. Shew, *op. cit.*

woman coming in from the fields with a barrow full of vegetables, with an idiot child of fifteen mounted on top, whom she was wheeling because the child was weary of walking.

Everything showed care and kindness on the part of the peasant attendants. To look after their charges seemed to be a settled part of their daily lives. There was nothing perfunctory in the services they rendered or exacted.

It is exceedingly difficult to represent in statistic form the curative value of the Gheel treatment, for the reason that the proportion of incurables admitted to Gheel is larger than in any of the closed asylums with whom comparisons must be instituted.

For instance, in 1879, of 313 patients admitted 73 were received from other Belgian asylums, of whom 71 were absolutely incurable. Under such conditions it would be obviously unjust to reckon the percentage of cures in the usual manner. Reckoned thus for the years 1853 to 1870, the proportion of cures was 24 per cent.*

On the other hand, basing his figures upon an enumeration of those cases which he considered from the first curable, Dr. Bulkens estimated the proportion of cures as from 79 to 89 per cent.

The question of proportion of cures as between the Gheel system and the closed asylums has been much discussed; and there is nothing satisfactory to be derived from the discussion. We will therefore leave the subject here.

I have said enough to indicate in a somewhat minute manner the main characteristics of Gheel. They are, comparative freedom, occupation, and the family life. We have walked about a town where the insane live with the sane and work with them in their homes and on their

* 3,021 entries, 724 cures or ameliorations. Dr. Peeters.

farms, eat with them at their tables, act sometimes as nurses to their children, and where they go about at will. And we have seen no excitement, commotion or disorder.

The picture is unlike anything to be seen in America or elsewhere in Europe, and therefore valuable for its contrasts and its suggestions. It is unusual to see the insane living their lives in natural surroundings.

Gheel in its entirety is probably an ideal which can never be repeated by any other nation, for the simple reason that there is but one village of Gheel, removed from the world's traffic and turmoil, where the inhabitants, by reason of centuries of inheritance, have learned a patience sublime in its simplicity, a tact in management born only of affectionate regard for their charges, and an absence of timidity impossible to realize until witnessed. There are services and solitudes which money cannot buy, and these we find at Gheel.

But though the "Gheel idea," *i. e.*, the "family system," consisting of a large number of families who would receive into their midst a thousand or more insane, may not be repeatable, the essence of this idea, *i. e.*, a large and reasonable liberty, healthful and sufficient employment, and accustomed and congenial surroundings, is repeatable; but not, certainly, in any of our great asylum buildings. Gheel teaches us the possibilities that exist in the treatment of the insane. It shows us that the insane will work cheerfully if well managed, and that they may be trusted, under proper precautions, with great liberty and not abuse it. It teaches us, moreover, how woefully wide our advanced civilization is from the mark it might attain to in the treatment of insanity.

A CASE OF PARALYSIS AGITANS CURED BY
CENTRAL GALVANIZATION, SODIUM
BROMIDE AND HYOSCYAMUS.

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THE following interesting case, interesting by reason of the rarity of cures obtained, occurred in the person of a Mrs. E——, aged 50, resident of New York City, and the superintendent of one of our charitable institutions. The disorder had come on gradually, as the result of domestic unhappiness and grief, and had finally culminated in a condition of subacute mania, complicating the case very much and very seriously. At first I declined to take such a case, and gave the ladies who were interested in the patient a very unfavorable prognosis concerning it. I was prevailed upon to say that I would treat her for one month, they agreeing to remove the patient at the expiration of that time if I could effect no improvement. At the time of admission the trembling was incessant and involved all the limbs. There were delusions of suspicion, and dread and fear of persecution,—in other words, marked mental disorder. There were hallucinations of sight and hearing. There would be exacerbations of

the tremblings, due to emotional disturbance. There was marked muscular rigidity and contraction, so that the head was thrown forward and fixed, and the trunk was also bent forward. Walking seemed very difficult, and also talking. The muscular force and the cutaneous sensibility were normal, so far as I could ascertain. There was marked tremulousness of the tongue when protruded. The trembling at first attacked one hand and arm, and gradually spread all over the body. I considered the case the most unfavorable one I had ever received for treatment, and did not hesitate to tell one or two of my professional friends that I regarded my patient as hopelessly incurable. I directed warm baths with cold effusion to the head at night, opened the bowels freely with a mercurial cathartic followed by salines, and then put my patient practically on a milk diet and secluded her from all society save that of her nurse, and directed the latter to administer, three times a day, drachm doses of sodium bromide and tincture of hyoscyamus. Fortunately I obtained a very good article of hyoscyamus, and I soon found to my surprise that my patient was improving, very much. Electricity in the form of central galvanization and also a bi-temporal current were employed. The mental excitement soon began to disappear, the muscular tremblings gradually subsided, very much in proportion as the mind became quiet, and at the end of one month I saw that my patient was rapidly improving. I accordingly allowed her to take moderate exercise in the open air and put her on a full diet. The rigidity and contraction of the muscles disappeared gradually, the gait becoming assured, the head coming up erect and also the trunk. The speech lost its tremulousness and the face assumed a much more bright and intelligent expression. At the end of the second month all mental disturbance had passed away, the mental facul-

ties remaining normal. I now discontinued the use of the sodium and hyoscyamus and also the central galvanization, substituting instead the induced current in the form of general faradization, using it as a nervous stimulant and tonic. I considered that by the constant current I had removed the nutritive defect in the central nervous system, improving the tone and nutrition not alone of the brain and cord, but also of all the deeper tissues of the body: A tonic containing quinine, phosphorus and strychnine was now ordered, and the patient's weight increased markedly during the third month of her stay here. At the expiration of the third month, she was discharged perfectly well, not a trace of trembling being visible in muscular action, speech or gait. The mental faculties were perfectly restored. My patient, against my advice, returned to her laborious post of duty, and has since remained perfectly well. I do not know that I should, in another case, get such a favorable result. I am afraid not.

My success in this case, however, warrants me in expressing the hope that such cases may have the benefit of long continued application of electricity, and my preference for the future would be hypodermic injection of $\frac{1}{30}$ grain of the crystallized extract of hyoscyamine, giving drachm doses of the bromide of sodium in half a tumbler of water, three times a day, between meals. Prof. Charcot considers it probable that the morbid anatomy of many of the cases that go on to a fatal termination, consists of obliteration of the central canal of the cord by increase of its epithelial lining, overgrowth of the nuclei which surround the ependyma, and marked pigmentation of the nerve cells, principally those of Clarke's posterior vesicular columns. In my case, if the paralysis agitans had depended upon an atrophic condition of the spinal cord, pons varolii, crura or medulla oblongata, or, in other words, had depended on

organic changes, I do not think a cure could have been obtained. On the other hand, I am inclined to think that, if there was degeneration, due to the new formation of connective tissue compressing the cord and nerve structures, the constant current *perhaps*, by its catalytic effect could have had the power to remove such new formation, freeing the compressed nerve structure. My case, moreover, may have depended on congestion of the nervous substance or the membranes of the upper part of the medulla spinalis, oblongata, and pons, which had not gone on to sclerotic atrophy, and the galvanic current unquestionably would have relieved that condition permanently.

I not only had to combat disease of the motor centres, but also of the intellectual centres. The disease, I presume, commenced in the cervical region of the cord, since the arm was first affected and soon the corresponding one.

I considered my case, however, probably to have been one in which there were weakness and irritability and instability of the molecular nerve structure of the nerve centres, owing, perhaps, to mal-nutrition, and that the disease was functional in character rather than organic. If so, then we may say that there are curable functional cases of paralysis agitans. My patient had not a rheumatic diathesis or any other morbid diathesis which could have disposed her to her disease. The case was to me exceedingly interesting, and I therefore ask the indulgence of those who may think I have devoted undue space to a single case.

Reviews and Bibliographical Notices.

I.—The optic nerve. The course of its fibres and their central termination according to recent publications.

A correct knowledge of the topography of the fibres of the optic nerve is a valuable guide in both diseases of the eye and of the brain. The prognosis of affections of the nerve varies with the nature of the lesion, which the oculist can sometimes recognize only by means of proper localization. The diagnosis, on the other hand, of the site of a brain lesion, is facilitated often by perimetric observation of the blindness caused by it. We propose to review in this article the various statements lately published regarding the course of the optic-nerve fibres.

An attempt has been made by Salzer (*Wiener Acad. Sitzungsberichte*, 1880, lxxxi, 3) to count the fibres of the optic nerve. By counting them in a given micrometric space and measuring the whole area of the optic nerve (minus the connective-tissue septa) with a planimeter, 438,000 was obtained as the most probable figure. By a similar procedure, the number of cones in the retina was estimated at 3 to 3.6 millions. This shows that probably about 7 to 8 cones are supplied, on an average, by one nerve fibre. The question, which of the bundles of fibres in the trunk of the optic nerve supply a given area of the retina, can not be solved by anatomical research alone. But by comparing the cross-sections of a partially atrophied nerve at the *post mortem*, with the impaired field of vision observed during life, an answer may be obtained.

But two such observations are as yet reported. Wilbrand and Binswanger (according to Hirschberg's *Centr. f. Augenheilkd.*, July, 1879) have seen an instance of *peripheral* constriction of the field of vision, which the *post mortem* traced to a neuritis

ending in atrophy. The central bundles of the optic nerves, however, were intact; only a peripheral ring underneath the sheath of the nerve was degenerated. Hence, in this case, the periphery of the retina received the peripheral fibres of the optic nerve.

Another instance of retro-bulbar neuritis is reported by Samelsohn, in the *Centralblatt f. d. Med. Wiss.*, No. 23, 1880. There existed during life a central scotoma, involving only the macula. The temporal side of the papilla showed an atrophic discoloration. The fibres supplying the defective macula could be recognized by their degeneration. They constituted an atrophied bundle in the centre of the optic-nerve trunk when examined at the optic foramen. The atrophy, perfectly symmetrical in both nerves, had not extended upward beyond the optic foramen. But in its course toward the eye, the atrophied bundle passed toward the temporal side of the trunk, and beyond the entrance of the central vessels it was found in the form of a wedge with its apex near the centre and its base not quite reaching to the temporal periphery. Both reports, hence, show that in the cross section of the nerve the fibres occupy about the same topographic relation as the retinal elements which they supply. Samelsohn points out, that in harmony with the superior dignity of the centre of the retina, the fibres innervating the macula (atrophied in his case) amounted to one-half of the entire nerve.

The most interesting part of the optic nerve is the chiasm. Whether this formation is due to a total crossing of the fibres of one optic tract to the nerve of the other side, or to a semi-decussation, is yet a question considerably agitated. All evidence, however, points to the latter view. In fishes, the interlacing of the fibres in the chiasm is either absent, or so simple that a complete crossing can be proven beyond doubt. But in all higher animals, there exists such an intricate interlacing of the two nerves that, according to observers like Meynert and Gudden, microscopic observations cannot decide the point. Recently, however, Stilling again reported at the Ophth. Congress at Milan, that he had followed the fibres with the naked eye. (*Centralbl. f. Nervenheilkd.*, No. 22, 1880.)

After hardening of the human chiasm in Müller's fluid and in alcohol, it was macerated in pyroligneous acid and then teased. He claims to trace thus both the decussated fibres and a bundle, equally large, of direct fibres. The latter are said to surround the crossing fibres. He claims, likewise, the existence of an an-

terior commissure uniting the two eyes. This formation no other modern observer has recognized.

Attempts have been made to test the semi-decussation experimentally. If the chiasm is divided by a longitudinal median incision, complete blindness necessarily indicates a total crossing of all fibres. Such was really the result in the older experiments of Beauregard and of Brown-Sequard. The former used pigeons. The latter does not state the kind of animal employed, but they were probably guinea-pigs or rabbits. But in all such researches the view of J. Müller must be used as a guiding star. This great physiologist predicted that the completeness of the decussation depends inversely upon the fusion of the two fields of vision, or, in other words, upon the angle included between the two orbits. The larger the common field of vision of the two eyes, the more voluminous must we expect to find the bundle of optic-nerve fibres, which does not decussate. In harmony with this view are the results of Nicati on the cat, an animal whose eyes have at least a partial field of vision in common. He perforated the base of the skull from below, and bisected the chiasm longitudinally. As he reported to the Paris Academy of Science (June 10, 1878), this operation does not render the animals blind. This fact alone establishes the semi-decussation in the cat.

The attempts have been more numerous to trace the fibres through the chiasm by means of a partial atrophy. Extirpation of the eyeball in a new-born animal simply prevents the further development of the corresponding nerve fibres. If the extirpation is performed some days or weeks after birth, atrophy of the fibres sets in in the course of several months. This atrophy occurs also in the human subject, but requires, evidently, several years for its completion, even if the eye is lost during childhood. Atrophy can likewise be produced, even more definitely, when the central termination of the nerve is destroyed in young animals.

Amongst the most fervent defenders of the semi-decussation is Gudden, whose articles are to be found mainly in the *Archiv f. Ophth.* (the most recent being xxv, 1, p. 1, and xxv, 4, p. 237). Pursuing his researches during many years, he has recently found that even in the rabbits, although there seems to be no common field of vision, there exists a small direct bundle. It could be demonstrated by destroying the central end of one optic tract or removing both tract and nerve of one side by cutting through the chiasm. In the course of six months the corresponding nerve

had atrophied completely, with the exception of a slender uncrossed fasciculus. In the dog the bundle of direct fibres is of larger size, though smaller than the decussating fasciculus. After the production of atrophy from either central or peripheral lesion the persistence of this fasciculus can be demonstrated amidst the other degenerative fibres. It can likewise be learned that the atrophy due to extirpation of the eye extends into both optic tracts, though the opposite one is more involved on account of the greater number of crossed fibres. These statements are contradicted by Michel, but in an untrustworthy manner (*Archiv f. Ophth.* xxiii, 2, p. 227). Some of his errors are due to a misunderstanding of the commissures included in the chiasm. Gudden describes them as follows: The commissure known under Meynert's name is to be found on the upper (dorsal) side of the chiasm, thence following the optic tracts toward the peduncle. In the rabbit it can be recognized most easily, though microscopically its course is seen to be the same in man and the dog. Behind the chiasm it moves toward the upper (dorsal) and median border of the tract, and can here be usually recognized, though covered with a thin layer of gray substance. It finally leaves the optic tract and dips down between the bundles of the pes pedunculi.

According to Gudden there exists, further (in man and mammalia), a strand of fibres on the upper (dorsal) side of the tractus opticus, in contact with, but distinct from, Meynert's commissure. The direction of the fibres is nearly transverse and they are ultimately lost in the substance of the tuber cinereum. Their morphological significance was not ascertained. A third commissure, called by Gudden c. inferior, runs toward the rear from the chiasm along the upper inner border of the tracts. It is so closely connected with the optic tract that it cannot be recognized separately. It can be easily demonstrated by enucleation of both eyes. The subsequent atrophy invades all fibres except the commissure. In the rabbit it can be recognized in a cross section of the normal optic tract by its relatively fine fibres, while in this animal the optic tract itself consists of coarse fibres.

One of the clearest descriptions of the human chiasm in case of atrophy is given by Kellerman (Zehender's *Klin., Monatsbl. f. Augenheilk., Ausserordentliches Beilageheft*, xvii, 1879). A patient who had lost his left eye by an accident in his third year died at the age of 40 with phthisis. The left eye was completely shrunken, and the nerve of that side totally atrophied. The right eye was

normal, but in its nerve there was found a small bundle, showing a descending atrophy which had not quite reached the eyeball. This bundle was found in the more central part of the nerve, below the centre, but near the eye it gained the temporal periphery. Its significance was not learned. In the chiasm it could be seen that about two-thirds of each nerve crossed into the tract of the other side. The decussation occurred mainly in extensive arcs. In the nerves the direct bundles are situated on the external side, but in the optic tract the intermingling was so complete that Kellerman could not trace them as separate fasciculi.

In another case, reported by Baumgarten (*Centralblatt f. d. Med. Wiss.*, 31, 1878), the topography of the optic tracts was different. At the *post mortem*, seven years after enucleation of the right eye, the right nerve was found completely atrophied. Degenerated fibres were found in both tracts to the extent of several millimetres beyond the chiasm. In the tract of the same side, the atrophied (direct) fibres existed mainly along the upper part of the periphery, less so in the upper external portion, while the crossed degenerated fibres were found in the other tract in the lower inner quadrant.

In the same number of the *Centralblatt*, Gowers reports, likewise, a case of ascending atrophy of one nerve extending into both optic tracts. Two further cases of atrophy of one nerve extending into both tracts were reported by Schmidt-Rimpler to the German Ophthalmological Society (1877). In his last articles, Gudden likewise details three instances of this nature, in which careful measurement showed the involvement of both tracts. All these cases prove that the crossed bundle in man is more voluminous than the direct fasciculus. At the last International Ophthalmological Congress at Milan (*Centralbl. f. Augenheilk.*, Nov., 1880), Purtscher reported six more cases of one-sided atrophy of the optic nerve, confirming, in all details, Gudden's views as regards the semi-decussation and the existence of an inferior commissure. In two cases of bilateral atrophy of optic nerves, Purtscher found intact only the inferior commissure of Gudden, and a few narrow strands of normal fibres in the midst of the degenerated tracts. These strands represent, probably, another commissure.

The semi-decussation of the optic nerves is also proven by a number of cases in which the hemianopsia existing during life was explained by the lesion found at the *post mortem*.* The most

* The term hemianopsia, introduced by Hirschberg, is preferable to the former word, hemianopia, since it signifies, in an unmistakable way, blindness toward one side,—loss of one-half of the field of vision.

instructive cases in which the lesion was found involving the visible part of one optic tract are the following :

Hughlings-Jackson (*Lancet*, May, 1875). Left-sided hemianopsia, hemiplegia and hemianæsthesia, caused by softening of the posterior half of the right thalamus. No other brain lesion.

Hirschberg (*Virchow's Archiv*, Bd. 65, p. 116). Right-sided hemianopsia, caused by gliosarcoma in the left frontal lobe of the cerebrum, the left optic tract being thinner than the right.

Pooley (Knapp's *Archives of Ophth. and Ot.*, v, 2, p. 148). Right-sided hemianopsia, due to a tumor in the left posterior lobe of the brain, and softening of the surrounding region, especially the left thalamus opticus.

Gowers (*Centralblatt f. d. Med. Wiss.*, 31, 1878). Left-sided hemianopsia. A small tumor in the inner and lower part of the right temporo-sphenoidal lobe, involving the optic tract, and extending into the crus cerebri. Degeneration of the right optic tract. The left tract and both optic nerves were normal.

I. Dreschfeld (*Centralblatt f. Augenheilk.*, February, 1880). Left hemianopsia, produced by a tuberculous tumor, extending along the outer lower side of the right thalamus opticus, and crowding that structure out of place and compressing the right optic tract. In another instance reported by the same author, a carcinomatous tumor, pressing on the right side of the chiasm and surrounding the right optic nerve, had produced temporal (left) hemianopsia of the left eye, but complete blindness of the right eye. On account of the position of the tumor, the case is, hence, not absolutely convincing. Similar doubts are permissible in the following instances :

Hjort (*Klin. Monatsbl. f. Augenheilk.*, v, 1867, p. 166). Left-sided hemianopsia of the left eye, but complete amaurosis of the right eye. The *post mortem* showed tubercles in the pia mater, also a few at the convexity of the cerebrum. A tuberculous tumor of the size of a hazel-nut was found in the right half of the chiasm.

Mohr (*Arch. f. Ophth.*, xxv, 1, p. 57). Left-sided hemianopsia of the right eye, but amblyopia of the left eye. The autopsy showed two cysts on the median side of the left optic thalamus, and a tumor of the size of a walnut pressing on the chiasm and left optic nerve. The real importance of the case is to be sought in the complete degeneration of the left optic tract, proving that the intact temporal half of the right retina received its fibres from the optic tract of the right side.

Even if the evidence of some of the last cases is considered

doubtful, the first instances quoted decide absolutely that the human chiasm represents a semi-decussation, and that each optic tract supplies the temporal half (*i. e.*, the smaller portion) of the retina of the same side and the nasal half of the opposite retina. In most of the cases the line separating the sensitive half of the retina from the blind area passed vertically through the point of direct vision. Hence each macula receives fibres from both optic tracts, which fibres remain on the corresponding side.

In cases of homonymous hemianopsia, the lesion must, hence, be referred to the optic tract of the side of the blind half of the retina. It may be situated anywhere in the rear of the middle of the chiasm, either in the exposed portion of the tract or in its concealed course, between its origin—the cerebral cortex—and its emergence at the base of the brain. The exact location can be diagnosed only by interpretation of other accompanying brain symptoms which, in the above cases, we omitted as irrelevant. Further instances of hemianopsia, due to cortical lesions, will be referred to for demonstration of the origin of the optic tracts.

With the exception of Stilling, no recent author has attempted to trace the roots of the optic nerve. Stilling read the following résumé of his researches at the meeting of the German Ophthalmological Society in 1879 :

“The optic tract, as it approaches the optic thalamus, divides into two branches, which pass separately to the external and internal geniculate bodies. At the place where these branches separate a third branch can be detected, which joins the anterior brachium conjunctivum, and reaches with it the corpora quadrigemina. At this place the fibres subdivide. A part of them passes over the superior (anterior) corpus quadrigeminum, and forms a commissure with the fibres of the other side; while another part spreads along the surface of this body and thence pursues a backward direction. The greater portion, however, enters directly the gray substance. The two corpora geniculata, hitherto called the points of origin of the optic nerve, are in reality but its ganglia. The fibres only surround and include the geniculate bodies, and thence pass, at least to a large extent, to the surface of the optic thalamus, where they form a layer of fibres. This arrangement had, indeed, been recognized by Reil many years ago. Some of the fibres pass around the external geniculate body, and terminate in the thalamus opticus. A third strand perforates the external corpus geniculatum to reach the thalamus. The medullary streaks of the geniculate body are, indeed, but the plates

of nerve fibres from the optic tract, between which ganglionic cells are deposited.

A deep horizontal section through the optic tract and foot of the peduncle shows a fourth branch of the optic tract entering between the fasciculi of the pes pedunculi. In some cases the fibres of this root radiate gradually into the substance of the peduncle. In other more demonstrative instances the root forms a distinct strand, separating itself from the rest of the optic tract and dividing into numerous fasciculi, which dip in between the bundles of the pes pedunculi. This root reaches and terminates in an almond-shaped gray nucleus situated below the substantia nigra, underneath the "red" nucleus of the tegmentum pedunculi. This body had been described by Luys as the "bandelette accessorie de l'olive superieure." Forel has termed it the nucleus of Luys. It seems almost, from this description, that the root described by Stilling is not at all an integral part of the optic nerve, but really the commissure of Meynert.

Stilling further describes a conical root arising from the tuber cinereum. Again, it must be doubted whether this is really a part of the nerve or the strand described by Gudden. Stilling refers to Gudden's former observations. In his recent article the latter showed, however, that this strand (perhaps a commissure) does not atrophy when the rest of the nerve degenerates in consequence of enucleation of the eyes. Finally, Stilling claims that another origin of the nerve is to be found in the substantia perforata antica. He details thus seven different points of origin, viz. : the branch from the optic thalamus through the external geniculate body ; the branch from the internal geniculate body ; the superficial branch in the corpora quadrigemina ; the nucleus in the pes pedunculi (?) ; the tuber cinereum (?) ; the substantia perforata antica, and the surface of the thalamus opticus.

At the meeting of the International Ophthalmological Congress at Milan (1880), Stilling demonstrated also the existence of a "spinal" root of the optic nerve (*Centralblatt f. Nervenheilk.*, Nov., 1880, p. 474). This root proceeds from the external geniculate body in a half spiral turn, and enters in a radiating manner the pes pedunculi. The author traced it in the macerated specimen through the pons into the medulla oblongata. He points out how the existence of this root can explain the mysterious connection between diseases of the optic nerve and affections of the medulla.*

* The last number of Hirschberg's *Centralbl. f. Augenheilk.* (December)

In a previous article (*Centralblatt f. Augenheilk.*, Feb., 1879) Stilling had shown the importance of the occipital lobe as a visual centre. In large cross sections it can be seen that numerous fasciculi pass from the optic thalamus into the medullary substance of the occipital lobe (previously described by Gratiolet).

Pathological observations have as yet contributed nothing to our knowledge of the topography of the optic roots in the interior of the brain. In the few instances which have been reported, the lesions were too extensive to allow of any conclusion. But evidence is gradually accumulating as regards the location of the visual centre in the cortex. Cases of atrophy of certain convolutions, following loss of one eye, are by far the most conclusive.

Huguenin has reported the following observations in the *Correspondenzblatt f. Schweizer Aerzte*, Nov. 15, 1878. A man, who had lost the left eye in his third year, died of pneumonia at the age of 56. Left optic nerve thin and atrophied; the right one normal. Left optic tract about one-half the size of the right tract, which is of normal size. Left pulvinar smaller than the right one; the corpora quadrigemina also much smaller on the left than on the right side. A similar difference in the size of the two external geniculate bodies, with absence of the superficial fibres derived from the optic tract on the left side. The two internal geniculate bodies alike in size. A noticeable atrophy in the cortex of both occipital lobes around the occipital fissure, where it passes from the median surface over on the convexity of the cerebrum. The atrophy is more marked on the right (opposite) side. The convolutions are thinned, and the sulci widened. The atrophy extends down also on the median side of the hemispheres, but not as far as the sulcus hippocampi.

The second autopsy was made on a woman of 42 years, dead of typhus, who had had small-pox during youth, and was nearly blind in both eyes. Both optic nerves equally and considerably thinner than normally, likewise the two tracts. The two pulvinaria also seem reduced in size. The corpora quadrigemina are flat-

contains a further report by Stilling. He describes a second spinal root, consisting of a large number of bundles, which leave the optic tract to reach the inner surface of the internal geniculate body, whence they pass, in a half-spiral turn, underneath the brachium conjunctivum posticum and join the lemniscus. Between the bundles of the latter they can be traced to the inferior olivary body. Other bundles, which at first pursue the same course, terminate in the nucleus of the motor oculi nerve. The latter discovery is an important confirmation of a physiological desideratum, whereby the path of reflexes passing from the optic nerve to the motor nerve of the iris is defined. Stilling has finally traced other bundles into the crus cerebelli ad corpus quadrigeminum and thence into the cerebellum.

tened, and the external geniculate bodies small and gray, on account of atrophy of the superficial fibres. In the cortex of the occipital lobes the atrophy, equal on both sides, invaded the same region as in the first case.

A similar instance is reported by Burkhardt in the report of the institution Waldau for 1879 (according to the *Centralblatt f. Nervenneilk'd*, 1880, Sept., p. 361). A man of 22 years had lost the right eye during youth, probably by injury. The left eye had a small central capsular cataract with fair sight, but there existed nystagmus. At the *post mortem* (death by purpura hemorrhagica) the convolutions were found well developed, but the gyrus angularis of the left side was smaller and less distinct than the corresponding part of the right hemisphere. A similar distance was observed in the precuneus of the two sides, the right one being the smaller.

The last case is evidently of less significance. It cannot be said what influence the imperfection of the left eye exerted, and the cortical region, moreover, is not the one toward which most clinical evidence points, though in agreement with Ferrier's experiments. But the first of Huguenin's examples demonstrates conclusively both the cortical centre and the semi-decussation. Instances of hemianopsia due to cortical lesion are more numerous in literature, but rarely, however, was the lesion so distinct and small as to equal in demonstrative value the cases of ascending atrophy.

Omitting various complicated cases with multiple lesions in different parts related to the optic tract, the following résumé is a complete list of all records which could be found :

Wernicke (quoted by Foerster in *Hand. b. d. ges. Augenheilk'd*, vii, p. 118). Right-sided hemianopsia, of sudden origin, with peripheral constriction of the remaining field of vision. Death in twenty months. A foyer of softening in the convexity of the left hemisphere, in a part of the occipital lobe corresponding to the operculum of the monkey. The spot extended backward two centimetres from an ideal continuation of the sulcus parieto-occipitalis. Above it reached the sulcus interparietalis ; it extended forward up to the turn of the first temporal convolution around the fossa sylvii, and downward to the sulcus between the first and second temporal convolutions. In the white substance it extended to the middle of the gyrus postcentralis.

Baumgarten (*Centralbl. f. d. Med. Wiss.*, 1878, No. 21). Sudden left-sided hemianopsia, with sharp line of demarcation through the point of direct vision. Sight and color-sense of the intact ret-

inal half were normal. Death, after several months, from kidney-disease. Apoplectic cyst of the size of a walnut in the right occipital lobe, comprising the three gyri occipitales. It did not quite extend down to the cavity of the right posterior ventricular horn. A second pea-sized spot of red softening in the roof of the left anterior horn, and a smaller apoplectic cyst in the centre of the right optic thalamus. Optic tracts, nerves and chiasm normal.

Jastrowitz (*Centralblatt f. Augenheilk'd*, 1877, p. 254.) Right-sided hemianopsia due to a gelatinous sarcoma in the occipital convolutions and precuneus, with softening in the circumference not attaining the optic thalamus. Optic nerves, tracts and chiasm normal.

Hosch (*Schweiz. Correspondenzbl.*, Sept. 15, 1878, p. 554.) Left-sided hemianopsia after apoplexy. Death after three years. Atheromatous condition of the cerebral arteries, multiple miliary aneurisms on the convexity of the brain. In the left parietal lobe a small exudation at the convexity and a small brown cicatrix in the white substance. Recent apoplexy on the left side of the third ventricle evidently the cause of death. All the other lesions were on the right side, in the region of the visual centre, viz. : large cavity due to the the destruction of the greater part of the right occipital lobe ; in the region of the corpus striatum a large pigmented cicatrix extending into the right thalamus. Atrophy of the inner bundles of both optic nerves in front of the chiasm. The multiplicity of the lesions deprives the case of much of its value.

Nothnagel (*Topische Diagnostik*, 1879, p. 389). Right-sided hemianopsia, apparently with gradual diminution of sight, which was difficult to determine on account of the mental state. Death after some months. Lesions on the right side of the brain consist in softening of the middle third of the anterior and posterior central convolutions, extending down to the centrum semi-ovale, likewise of a portion of the superior parietal lobe and circumference, and of the third occipital convolution. On the left side were found two patches of softening in the temporal and parietal lobes and total destruction of the occipital lobe. Again no definite conclusion can be arrived at on account of the multiplicity of the lesions.

If we compare these pathological observations with experimental results on animals, a certain agreement is evident. Ferrier in his earlier observations claimed that destruction of the gyrus

angularis caused merely blindness of the opposite eye in all animals examined, including monkeys. He has now modified these statements. At the meeting of the British Association in Cambridge (1880) he reported the results of limited extirpations of cortical centres undertaken with Dr. Yeo. By means of antiseptic dressings the monkeys recovered quickly, and could be kept alive permanently (preliminary account by Pierson in the *Centralblatt f. Nervenheilk'd*, Oct. 1, 1880, p. 393). He claims that the occipital lobes can be removed completely without blindness if the lesion does not extend beyond the parieto-occipital sulcus. Extirpation of the angular gyrus of one side causes a complete blindness of the eye of the other side, which disappears in some hours. The restitution of sight does not depend on the integrity of the cortex of the other side, since subsequent destruction of the other angular gyrus causes either no blindness at all or but a transient trouble. Simultaneous destruction, however, of both angular gyri gave rise to a complete blindness, lasting three days, with imperfect recovery of the sight. Hemianopsia can be caused by destruction of the angular gyrus and occipital lobe of one hemisphere, the retinal halves of the same side being the parts involved, but even this lesion is but transient in its effects in the monkey. Ferrier states even that full sight will ultimately be regained if both occipital lobes and the gyrus angularis of one side be destroyed, as long as only one gyrus angularis remains intact. Destruction, however, of these parts in both hemispheres leads to irreparable blindness without impairment of other senses.

An interpretation of these results seems as yet scarcely possible. They are, moreover, at variance with the experiments of Munk, although Ferrier has, in his last statement, allowed (with Munk) some importance to the occipital lobes as visual centres. Ferrier's claims regarding the rôle of the gyrus angularis have received some support by observations made by Fürstner and reported at the meeting of southwest German neurologists at Heidelberg in 1879 (*Centralblatt f. Nervenheilk'd*, June 1, 1879).

On extirpating the left eye of some new-born puppies, he found, after the lapse of seventeen weeks, atrophy of a spot in the second longitudinal convolution of the right hemisphere, corresponding to the angular gyrus of the monkey. However, it must be remembered that the recognition of partial atrophy in the cortex without microscopic change is a matter of individual judgment. Caution, moreover, is not out of place, when we remember that the semi-decussation in the dog is definitely proven.

Munk's experiments on monkeys have not been very numerous, but they are stated in a very definite way. He denies all importance of the gyrus angularis for visual purposes. A suggestion he makes may indeed serve to explain Ferrier's contrary results. According to Wernicke, the corona radiata, uniting the ganglia of the optic nerves to the occipital lobes, passes underneath and close to the gyrus angularis. Hence any deep extirpation would involve these fibres. Evidently not all the uniting fibres take this course, since destruction of both angular gyri does not produce permanent blindness. Munk claims that only the occipital lobes, but these in their entire extent, represent the visual centre. Each hemisphere controls both retinæ in the monkey in such a manner that the external half of the occipital lobe represents the temporal half of the retina of the same side, while the median part of the occipital lobe receives the fibres coming from the internal half of the other retina (Verhandl. d. Berlin. phys. Ges. in *Archiv f. Anat. & Phys.*, 1878, i and ii, p. 168, and 1880, iv and v, p. 149). In monkeys, therefore, destruction of one occipital lobe causes permanent hemianopsia.

The experiments of Munk on dogs are more complete (*Arch. f. Anat. and Phys.*, 1878, pp. 162, 547 and 599; 1879, p. 581).

The most marked visual disturbance was found on extirpating a relatively small spot near the upper posterior apex of the occipital lobe. While the eye of the same side appeared normal, the animal had lost the use of the other eye almost completely. It could still see with the eye opposite the site of the lesion, but failed to interpret the visual impressions. The sight of that eye improved gradually, but never became normal. Munk called this trouble "psychic blindness," but admits, in his last memoirs, that it can be explained by the assumption that this cortical spot corresponds to the retinal macula, or at least the spot of direct vision. The animal, hence, retains only the use of the peripheral and less sensitive part of that retina. Munk denies, however, that the simple supposition of blindness in the centre of the retina will account for the phenomena; he still insists on psychic blindness under these circumstances, due to loss of visual remembrances. Further experiments showed him that in the dog also each hemisphere represents parts of both retinæ. The direct fibres, however, supply the extreme temporal portion of the retina of the same side, the extent and sensibility of which are so slight that its integrity is easily overlooked when the rest of that retina is blind. These fibres terminate in the extreme external part of the occip-

ital lobe of the same side. The greater internal part of the cortical centre sends its fibres to the retina of the other side, with the exception of its temporal periphery. The topographical representation of the retina in the visual centre is such that the upper periphery of the retina is represented by the anterior border of the occipital lobe, the lower retinal area by the posterior part, and each lateral retinal border by the cortical margin of the corresponding side. In the dog, hence, the retinal spot of sharpest vision receives its fibres from the cortex of the other side; the hemianopsia, therefore, caused by one-sided destruction, is difficult to detect. Munk claims that the effect of all extensive lesions of the cortical centre is permanent, though difficult to detect after a time on account of the adaptation of the animal by the movements of its eyes.

Lastly, the results of Luciani and Tamburini must be mentioned, which are again at variance with the above statements (Riv. sperim. di frenatria, 1879, 1 and 2, quoted in *Centralbl. f. Nervenheilkd.*, October, 1879). As regards the monkey, they have found that the entire occipital lobe is concerned in vision, and not merely the angular gyrus.

They admit the semi-decussation in the monkey, having seen hemianopsia produced by one-sided destruction. In the dog the visual centre is located by them in second (upper) longitudinal convolution from the front to the rear. Destruction of this region on one side causes, as they observed, nearly complete blindness of the other eye, and slight amaurosis of the same side. They claim that these results are not permanent, but compensation is effected by vicarious activity of the unimpaired remnants of the centres, especially the one of the other side. Finally, they refer to an experiment upon a monkey, in which removal of both angular gyri and both occipital lobes permitted a moderate recovery of sight. Of the various experimental results, those obtained by Munk are brought forth in the most trustworthy manner; and whether or not we accept Munk's explanation, they agree best with pathological observations on man. [H. GRADLE.]

II.—On the use of the cold pack followed by massage in the treatment of anæmia. By MARY PUTNAM JACOBI, M.D., and VICTORIA A. WHITE, M.D. New York: G. P. Putnam's Sons, 1880.

This work is a practical contribution to scientific therapeutics. It consists of three articles originally contributed to the *Archives*

of *Medicine* during the past year, but now republished in book-form. The first of these, by Mrs. Putnam Jacobi, reports eleven cases of anæmia, more or less complicated in most with nervous symptoms, in which she had been led to utilize the cold pack by the belief that it would increase or accelerate tissue metamorphosis and thus indirectly increase assimilation and nutrition. Together with the pack, massage was employed with rest, as advised by Weir Mitchell. For medical treatment iron was in most cases given in small and frequent doses, and other remedies *pro re nata*. The urine was carefully measured and analyzed during the treatment, and the results of several of the cases are given in tabulated form.

In the second and third articles, which alone seem to show the joint authorship indicated in the title, these cases are analyzed and discussed. The results of the cold pack and massage treatment were, increase in amount of urine during and after the pack, actual increase but relative decrease of urea excreted, and generally a slight increase also of extractive and inorganic salts. Later there was a decrease of excretion both of water and of urea, so that the actual amount for the day was not decreased. In some instances, where there was an actual increase in the excretion of urea for the twenty-four hours, if this condition persisted, symptoms of *malaise* or exhaustion appeared. It seems, therefore, that the compensatory decrease was a normal and necessary result. On a few occasions, massage was given without any preceding pack and a somewhat less marked increase of water and urea in the urine was observed than when both were given.

In order to test the effect of the pack alone, it was given to three healthy women and the same results obtained as in the other cases.

The beneficial results of this treatment were, increase of appetite, relief of insomnia, enrichment of the blood as shown by reëstablishment of menstruation in three cases of prolonged amenorrhœa, and disappearance of intense dyspeptic symptoms. In one case there was a rapid involution of a subinvolted uterus, but as ergot was given at the same time, it cannot be said that the hydro-therapy and massage produced this result. In two neurasthenic cases, in which nervous headache was a prominent symptom, the appetite and the general condition were not at all improved, but rather the reverse, by the treatment.

The remainder of the book is given to a discussion of the pathological conditions of anæmia and the physiological modes of ac-

tion of the cold pack with or without massage. We cannot here follow in detail this very elaborate discussion, but will merely give the substance of the results arrived at by the authors. They recognize in anæmia a morbid condition often congenital or early acquired, characterized by an inability on the part of the tissues to condense oxygen and store albumen in sufficient quantity. Hence the reserve material for the elaboration of force is lacking and this elaboration fails; there is a general functional debility. They criticise Dr. Weir Mitchell's *brochure* on massage, as having overlooked the fact that anæmic muscles are in a state of chronic fatigue in which they cannot receive benefit from being stimulated to fresh contraction alone. That is, when waste exceeds repair, no good can come from simply increasing waste; a bottom principle in the treatment of all these asthenic conditions on which we do think Dr. Mitchell has not always laid sufficient stress. Therefore, the criticism may be, to some extent, a just one, and there has been started by his little work a furor for massage that may have been carried to an irrational extreme in some cases. When massage alone does not succeed in increasing the blood supply of the muscles, its effects, as here stated, are likely to produce only further exhaustion.

The following is the summary of the effects of the cold pack in anæmia as stated by the authors:

"The cold pack meets the following indications for the treatment of anæmia thus understood:

1. "In the first moments of application it produces the same stimulation of the peripheric nerves as may be caused by any application of cold—shower-baths, douche, plunge-bath, etc.

2. "It impresses upon the mass of circulating blood a profound movement of oscillation first from without inward, then the reverse. The effect is different in the two periods.

"During the inward movement of the blood, the tension of the abdominal blood-vessels, which has at first been lowered through the agency of the depressor nerve, at first relaxed, becomes raised by the increased volume of blood driven to them and circulating through the abdominal viscera, not with increased rapidity but with increased force. As a consequence there is:

- a. "Increased metamorphosis of albuminoid substances in the liver and spleen, resulting finally in greater production of urea. When iron is absorbed with the albumen, there seems to be initiated in these same glands more abundant regeneration of red corpuscles.

b. "Increased consumption of stored or latent oxygen in the series of oxidations culminating in urea. Hence, during the period following the pack, probably increased absorption of oxygen, coinciding with diminished oxidations. These latter are indicated by diminished production of urea (of carbonic acid also?).

c. "Possibly increased movement of assimilation of now decomposed albumen (and other food), coinciding with the movement of increased decomposition affecting that portion of circulating albumen which has originated the urea, both movements immediately dependent on an increased force of elementary intervascular circulation.

d. "Probable assimilation of the non-nitrogenous portion of the decomposed albumen.

e. "Increased elimination of water from the kidneys and, hence, aspiration of excess of water from anæmic tissues.

f. "During this elementary outstreaming of water, facilitated washing away of acid fatigue-products from nerves and muscles.

"This latter (calculated) effect, to be attributed partly to the second half of the movement of oscillation of the blood mass. During this secondary movement from within outward, we have :

A. "Diminution of passive hyperæmia in the alimentary mucous membrane.

B. "Increased nutritive absorption, partly in consequence of allayed hyperæmia, partly as the direct expression of a movement of fluids outward from the alimentary canal.

C. "Afflux of blood to muscles, enabling them to increase their store of contractile material, and thus become more capable of exercise.

D. "In this afflux, and on account of thermic irritation of the peripheric nerves, increased production of heat. From the coincident immobility of the body and the arrest of radiation, a certain proportion of this increment saved. (The increment of urea is probably derived in part from increased chemical changes of circulating albumen in the muscles during the production of heat.)

E. "In the production of heat in response to a physiological stimulus, the nervous system, through the portion involved in the reflex mechanism, is especially stimulated, and the stimulus is immediately followed by special provisions for repose.

F. "During the afflux of blood to the periphery, blood is drawn from the nerve centres, which are thus placed in a condition

analogous to sleep—a condition favorable to repose and nutritive assimilation.

“The establishment of an equilibrium of temperature is followed by a cessation of chemical activity in the muscles, and necessarily by sedation of the nerves. These effects are of especial symptomatic importance in irritable anæmias.

3. “During the pack the radial pulse is slackened, and its tension lowered. We may infer increased facilities for nutrition in tissue elements hitherto irritated rather than nourished by a blood stream imperfect in quantity and too rapid in duration.

“Massage intensifies and prolongs some of the effects of the pack when this has been previously administered.

“Given alone it is much less effectual than the pack, because its influence is less complete, and especially because it is less certain to determine blood to anæmic muscles.

“In cases of ‘neurasthenia’ or of hysteria, the cold pack is only beneficial in proportion to the coexisting anæmia. If this is not marked in proportion to the neurotic element, the pack may be useless or even injurious.

“The cold pack is decidedly dangerous, if administered too near to periods of abdominal hyperæmia, whether physiological, as digestion and menstruation, or pathological, as in lurking peritonitis.”

We need add nothing to this summary except to say that it is well supported by the argument in the preceding text and that the treatment appears every way exceedingly rational. That experience has confirmed its value is shown by the cases here narrated. The work is a real contribution to medical literature.

III.—The brain as an organ of the mind. By H. CHARLTON BASTIAN, M.A., M.D., F.R.S., etc. New York: D. Appleton & Co., 1880.

This book has been widely advertised in newspapers and medical journals, and we have met with many physicians who are disposed to regard it as a stupendous achievement in neurological literature. Students who have kept pace with the advances in microscopical research, who have carefully read the short but multitudinous monographs, polemical, dogmatic, and strictly scientific, which, month after month, appear in the better class of physiological and medical periodicals, cannot avoid a feeling of surprise that an attempt to condense such matters into the form in which Dr. Bastian presents it to us, should have attracted so much general attention.

It is an evidence of the interest taken in these subjects by those who are obliged to derive their information at second-hand from compilers, and who must, from this fact, be necessarily behind the times.

Dr. Bastian has himself done some honest original work, and has, therefore, a respectable position as an investigator. This popular work will not, we think, enhance his reputation, however complete and instructive it may be to the general public ; it is too unsatisfactory to the student or specialist in this department.

The world has but few really original investigators, but many popularizers. There are few who have the ability or the desire to pin themselves to facts as they have been toilsomely discovered in laboratory or field, and make legitimate deductions therefrom ; while the imagination runs riot in print everywhere. We are not inclined to disparage the use of the imagination in scientific research, but it must be kept within bounds. We are led to think that no more imaginative explorer ever existed than Faraday, for he said that for every theory the scientific man ventured to publish, thousands had been crushed before they were formulated into words. While Meynert, we fancy, was of that kind of whom Bacon spoke when he said there were "men who could not reason beyond a fact" (for we find him carefully essaying a few ventures outside his "Brains of Mammals," and generally getting beyond his depth), Bastian has not reasoned even up to the facts. He has not let his imagination carry him a step beyond, nor even as far as recent investigations permit advances to be made. He is some years behind the times in having published what purports to be an exposé of neurological science. We have the book as an evidence that in something like a hundred years from now the medical and general public will have some appreciation of what is being accomplished in the way of psychological, physiological, and anatomical research. Particularizing, the first chapter treats of the uses and origin of a nervous system, wherein he quotes his own "Beginnings of Life" and writings of Spencer, the former being based upon the latter largely. The second chapter is on the structure of a nervous system, copied from elementary and ancient works on anatomy. The remainder of the book consists in most part of a literal quotation of Gegenbaur's "Elements of Comparative Anatomy," interspersed with occasional passages from Huxley's "Vertebrate and Invertebrate Anatomy," with a dissertation upon "Phrenology, Old and New," derived from a reading of Ferrier on "Localization of Function," concluding with a glance at men-

tal processes, wherein Sir Wm. Thompson, Ziemssen's Cyclopædia (Kussmaul), and Ferrier's later work on "Localization of Cerebral Disease" are made to do good service.

The work concludes with an appendix, which is wholly devoted to a discussion of views concerning the existence and nature of a muscular sense, views which may appear novel to Bastian, but which read tiresomely to those who have indulged in their perusal *ad nauseam*.

To sum up :

Bastian's work is useful in being a serious though unavailing attempt to bring psychological and physiological knowledge of a few years back into accord. It is also useful to genuinely scientific men as an evidence of the money that can be made by stepping aside from vigorous methods of investigation to indulge the natural curiosity of those who earnestly desire to know what is going on in those fields without the necessity of acquiring the ability to weigh logically the value of the details encountered. At the same time, it warns the scientific man that were he to undertake some such work as this he would be liable to fall behind as signally as Bastian has. [s. v. c.]

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VIII. OPHTHALMIC AND OTIC MEMORANDA. By D. B. St. John Roosa, M.D., and Edward T. Ely, M.D. Revised Edition. New York : Wm. Wood & Co., 1880. Chicago : W. T. Keener.

IX. THE MEDICAL RECORD VISITING LIST ; OR, PHYSICIAN'S DIARY, for 1881. New York : Wm. Wood & Co. Chicago : W. T. Keener.

I. This is somewhat different from most works on the practice of medicine, in that it enters at once on the special part of its subject without any preliminaries on general principles of pathology, symptomatology, etc. This is, in some respects, a disadvantage, if the work is intended as a student's manual, for it is not always the case that the medical student will possess special works on pathology, or, if he does, will always associate their contents properly with their practical applications in special diseases. It is no disadvantage, however, to the practitioner who wishes to obtain the views of so able a therapist as Prof. Bartholow, on the nature and treatment of the several diseases, and while it ought not to be alone depended on by the student, its clear and positive statements and condensed style will undoubtedly make it as popular as the treatise on therapeutics to which it is intended to be a companion volume.

Dr. Bartholow, as he himself says in the introduction to the present volume, is by no means in sympathy with what he calls "the therapeutic nihilism of the day," and this is made evident throughout. Some of the doses recommended seem almost heroic, as, for example, half a drachm to a drachm of bromide of potassium, frequently repeated, in that form of migraine "dependent on contraction of the arterioles." Duquesnel's aconitia is mentioned as employed in solution, internally, in doses of from one-hundredth to one-twentieth, or even one-tenth of a grain, and the qualification "very cautiously" seems to be scarcely enough with these minimum and maximum doses.

We notice also that Dr. Bartholow does not appear to recognize the popular modern affection known as "neurasthenia" or nervous exhaustion. Indefinite as it may appear to be, this name implies, to our mind, a condition that is not included under any other head, and the importance of which is not easily overrated.

We might notice other points in which the work apparently calls for criticism, had we the space to give. But these do not materially detract from its general merits; it is in most respects an admirable work of its class, and one which, we doubt not, will meet with the same general approval that has greeted the author's volume on *materia medica* and therapeutics.

II. The seventh part of Duhring's atlas of skin diseases contains the plates and text on *eczema* (*pustulosum*), *impetigo contagiosa*, *syphiloderma* (*papulosum*), and *lupus vulgaris*. In all respects it seems to be fully up to its predecessors in merit, and the good words we have been obliged to give for these illustrations have become almost monotonous. We are unable, however, to change the tone; the series is as fine, in its way, as anything we have ever seen.

III. The demand for a second edition of a work almost within a year from its first publication, is itself sufficient evidence of a certain sort of merit in a book, or at least that it meets a felt want. This volume certainly does fill a place in medical literature, and its value is unquestionable. As far as we can see, it is accurate, and, with the additions made in this second edition, much more nearly complete. It is a work well worthy a place in every practising physician's or surgeon's library.

IV. Dr. Jacobi's reputation will go far to insure any work of his careful attention, and the present volume will in no way detract from it. It is a thoroughly scientific and also practical treatise on diphtheria, its history, etiology, pathology, symptoms and treatment, and one that will be, we believe, the standard monograph on its subject for a considerable time to come. Dr. Jacobi does not uphold the bacteria theory of the disorder, and quotes with high approval the recent researches of Wood and Formad on the subject, in an appendix to his preface, their paper not having appeared in time to be noticed in the text. As regards the question of the identity of croup and diphtheria, he considers it as yet one that lacks evidence enough for any positive decision either way. The work is throughout scientifically conservative, and advocates no theories that do not rest on adequate bases.

About one-third of the book is devoted to the treatment of diphtheria, and here the reader will find discussed nearly everything that has ever been recommended or used in the disease, with the most judicious remarks on each by the author. Notwithstanding the space allowed, there is a very great condensation and conciseness of statements.

Dr. Jacobi's style is clear and very readable, though he occasionally introduces a Germanism. The make-up and typography of the work are excellent. It is one to be recommended to every practitioner.

V. This, it would appear to one who is not a specialist in the department of aural surgery, is likely to be a useful work. It is intended, as the author says in his preface, to show the usual types of ear disorders as met with in hospital and private practice. So far as we can judge, it is quite comprehensive in its scope, and we have been able to find in its pages mention of at least one minor aural disorder that we have looked for in vain in one or two more pretentious works on otology. Appearing, as it does, in a cheap series of medical publications, it seems to us well worth its cost.

VI. We have already noticed the two previous volumes of Trousseau and Pidoux's therapeutics in our last number. The present one completes the work which, as a whole, is, in the form it now appears in Dr. Lincoln's translation, a useful addition to the medical literature of our language.

VII and VIII. These two little volumes are intended as convenient aids for cramming and reference. They are too brief for text-books, and are liable to the objection to short compendiums generally, that they encourage superficial study and prevent students from obtaining the large works from which alone an approximately thorough knowledge of their subjects can be obtained. The special disorders of which they treat are not so limited or so infrequent that the average physician requires no more information concerning them than these volumes afford. Nevertheless, they can be of service as works of ready reference; their authors are men of reputation in their several departments of medicine, and their names are a guarantee of accuracy and give the volumes a certain authority. They are handsomely gotten up, and very convenient in size for pocket reference books, and are worth their price to those who can properly utilize them.

IX. This is one of the neatest in appearance of the visiting lists of the year. It contains, besides the usual calendar and dose list, formulæ for hypodermic injection, lists of poisons and their antidotes, directions for emergencies, memoranda of urine analysis, cautions, tables for calculating duration of pregnancies, antiseptic and disinfectant directions, etc. It also contains a catheter gauge, that may be useful for other purposes, such as estimating the size of the pupil, etc. The ruling is also very conveniently arranged for the physician's wants.

Editorial Department.

WE have received the minutes of the business meeting of the Council of the National Association for the Protection of the Insane and the Prevention of Insanity, held at New York, November 11th, of the past year. In addition to regular routine business, the following resolutions were formulated and adopted :

1. "Resolved : That Mary Putnam-Jacobi, M. D., Margaret A. Cleaves, M.D., E. C. Seguin, M.D., J. C. Shaw, M.D., be a committee to take such steps as shall be best calculated to induce medical colleges, medical journals, and asylum authorities to do all in their power to diffuse a better knowledge of psychiatry amongst the profession, and to specially educate physicians who may desire a thorough knowledge of the subject.

2. "Resolved : That a committee of five, the chairman of which shall be president of our association, be appointed by the president to obtain facts and statistics relating to the methods and use of *restraint* and the use of *labor* in the asylums of this country.

3. "Resolved : That a committee of five be appointed to assist in the investigation the New York Senate Committee (appointed last winter by the New York Senate to investigate the condition of the insane, and management of the state lunatic hospitals, and county insane asylums of the state, and to report to the next legislature) is now making, in such a manner as shall be deemed advisable."

The first of these committees, as appointed, consists of the chairman, Dr. Wilbur, Judge Andrews of Ohio, Dr. Reynolds of Iowa, Dr. Corbus of Illinois, and Hon. F. B. Sanborn of Massachusetts. The second is made up of Drs. E. C. Seguin, M. Putnam-Jacobi, G. M. Beard, H. B. Wilbur, and Miss A. A. Chevallier.

It will be seen by this programme that this new association intends to make itself felt as a motor for reform. That reform is needed in some places is sufficiently evident from the revelations before the above-mentioned Senate Committee and elsewhere, and it appears useless to expect it from the Association of Asylum Superintendents, the only heretofore constituted body dealing especially with the questions of insanity. From the composition of these committees we look for good work to be reported at the meeting next June.

Scarcely an asylum has been the subject of investigation in which some abuse has not been unearthed, or some phase of asylum management shown to be inadequate or faulty. Let the good work go on in a proper spirit. Let the modes of treatment, the amount and kind of medical service be carefully inquired into. Let it be ascertained how much care is taken to find out the real condition of a patient on entering an asylum, and how often they are seen. What are the appliances for treatment? What are the principles of classification? What pains is taken to watch nurses or attendants, to check the disposition toward cruel treatment to which the less scrupulous attendants are tempted? Inquire into the financial management down to the minutest details once for all. Let all these things be done, not for the purpose of harrassing the medical officers of asylums, or in a spirit of fault-finding, but to find out where are the defects of asylum management in our own country, and how they may be removed. It is simply useless for asylum superintendents any longer to expect those who may have friends or relatives in these institutions, or even the general public, to remain quiet with the annual exposé of the bad results of our present system in this or that asylum.

WE have received from Dr. J. J. Mason of New York City, on two different occasions, sets of micro-photographs of thin sections of the spinal cord at different levels, and under various powers. They are by Dr. Mason himself, and are from his own preparations. They are without exception the clearest and best photographs of nerve tissue we have ever seen. Taken altogether they are so exceptionally good as to be subjects for admiration. They are among the fruits of a prolonged study of the spinal cord in lower vertebrates, upon which the author has been long engaged. Fortunately Dr. Mason has the leisure, taste and means to enable him to pursue the scientific side of a study of the nervous system, and we shall look forward with pleasant anticipation to the final results of his unselfish labor, pursued for the love of science.

THE "HAMMOND PRIZE" OF THE AMERICAN
NEUROLOGICAL ASSOCIATION.

THE American Neurological Association offers a prize of five hundred dollars, to be known as the "William A. Hammond Prize," and to be awarded at the meeting in June, 1882, to the author of the best essay on the *Functions of the Thalamus Opticus in Man*.

The conditions under which this prize is to be awarded are as follows :

1. The prize is open to competitors of all nationalities.
2. The essays are to be based upon original observations and experiments on man and the lower animals.
3. The competing essays must be written in the English, French, or German language ; if in the last, the manuscript is to be in the Italian handwriting.
4. Essays are to be sent (postage prepaid) to the Secretary of the Prize Committee, Dr. E. C. Seguin, 41 West 20th Street, New York City, on or before February 1, 1882 ; each essay to be marked by a distinctive device or motto, and accompanied by a sealed envelope bearing the same device or motto and containing the author's visiting card.
5. The successful essay will be the property of the association, which will assume the care of its publication.

6. Any intimation tending to reveal the authorship of any of the essays submitted, whether directly or indirectly conveyed to the committee, or to any member thereof, shall exclude the essay from competition.

7. The award of the prize will be announced by the undersigned committee, and will be publicly declared by the president of the association at the meeting in June, 1882.

8. The amount of the prize will be given to the successful competitor in gold coin of the United States, or, if he prefer it, in the shape of a gold medal bearing a suitable device and inscription.

(Signed)

F. T. MILES, M.D., Baltimore.

J. S. JEWELL, M. D., Chicago.

E. C. SEGUIN, M. D., New York.

Two years ago we noticed and expressed our approval of a proposition to amend the Illinois law in relation to the commitment of lunatics. That measure, as is well known, failed to pass the legislature on account, we suppose, of the public sentiment of jealousy for the rights of the individual; and the jury trial of the insane, with all its disadvantages, is still the only legal method of commitment.

It is probable that a new attempt to change the law by the same or similar provisions as those then introduced will be made this winter. It is probable that it will, to some extent, meet with the same opposition; but the chance of its success is, we think, much better now than then. To insure it, however, some recognition should be given to a popular sentiment which, no matter how misdirected it may be occasionally, is founded on correct principles. Our present law does not provide against unjust commitment so well, in fact, as the law proposed as a substitute for it two years ago, and neither of them contained the necessary provisions for the protection of the insane once committed. The only real guard against abuses in our asylums, in our present law, so far as we are aware, is the provision for their inspection by the State Board of Charities. How adequate this provision is can best be understood from the following facts. The State Board of Chari-

ties consists of several professional gentlemen, one of them a physician, who serve without salary, and are obliged to borrow the time for their official duties from their daily bread-winning occupations. Their secretary, on whom really most of the actual labor of the Board devolves, is not a medical man, but a clergyman, and though an able statistician and expert in administrative matters, can hardly be expected to possess the intimate knowledge of diseases of the brain and mind that is needed to properly inspect an insane hospital and be independent, in all matters requiring medical knowledge, of the resident officials whose critic he is to be, and if he does possess this knowledge, his duties are so numerous in other directions that it would be impossible for him to properly attend to the duties of inspection. In fact, the State Board of Charities may do all that can reasonably be asked of it, and yet let this particular duty entirely alone.

The remedy for this condition of affairs is simply the appointment of a competent and otherwise well-qualified medical man as state commissioner or visitor in lunacy, who shall, acting, it may be, as regards the immediate management of the asylums, in chiefly an advisory capacity, visit each and every institution in the state unannounced and at unexpected times, as often as four times a year, and make the most thorough examination of every detail relating to the immediate care of the insane, investigate all cases of suicide, homicide, or accidental death ; hear complaints, have private interviews with patients if desired by them, inspect the diet, visit all portions of the wards at all hours, and with and without the company of the resident officers, and, in short, fulfil the functions, with perhaps less direct authority, of the English commissioners in lunacy, under whom so beneficial a change has been effected in the management of the insane in Great Britain. This officer should receive a salary commensurate with his duties, and travelling expenses. Asylum authorities should be obliged to afford him every facility, but he should be absolutely independent of them in all respects, not owing them the slightest favor, and they should have nothing to do with his appointment. He should make a report, annually, to the governor, or biennially to the leg-

islature, which should be published. His office should be held during good behavior, subject to removal by the governor, or better, by the Supreme Court. All correspondence with him by the patients should be inviolate, and all letters withheld by the superintendents should be submitted to him.

These are a portion of the duties that would devolve upon such an official, and it is easy to see that their proper fulfilment would be amply sufficient to occupy all his time, and that it is saying nothing to the discredit of the Board of Charities when we say that it cannot be expected of them. If all the insane in county alms-houses are to be visited as they should be, there is more than enough for two such officials in the state of Illinois to do.

In stating the necessity of such an appointment for the proper protection of the insane, we do not intend to imply any charges against the present management of our state hospitals. For all we can say, they are as well managed as the average of similar institutions in this country, and some of them probably better. But, under the present system of non-oversight, this is, like a benevolent despotism, at best only a happy accident. Nothing, however, is so absolutely perfect that improvement is not desirable, and this desirable end will be best obtained by constant oversight and judicious criticism. Moreover, such an official would be a protection not only to the insane wards of the state, but also to the asylum authorities who, however well they may strive to do their duty, are constantly liable to suffer from misapprehension and suspicion on the part of the public. If they should fail to do their duty, the value of such an honest inspection is obvious.

There is one other point worthy to be noted. Any such change in the present law as is contemplated is likely to open the way to the establishment of a certain number of private asylums. These establishments have their uses; in fact, we believe that the present lack of a certain class of them is a serious disadvantage at the present time. But of all kinds of business, this keeping of a private asylum is one that most needs proper governmental supervision, and this can be best given by the method we have indicated. In connection with the State Board of Charities, of which he

should perhaps be an *ex-officio* member, the commissioner in lunacy should examine the character and qualifications of all persons desiring to open such asylums, examine the buildings and their situation, and grant or refuse licenses accordingly. They should also have the power to revoke such licenses, once issued, for sufficient reasons, and no one should, under severe penalty, open such establishment or attempt to otherwise take the care of the insane, for profit, away from their own homes, without such license. Only in some such way as this can security against abuses be obtained.

Pexiscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

THE INNERVATION OF THE HEART. An exhaustive article on the ganglia in the frog's heart is to be found in Pflüger's *Archiv* (Bd. xxiii, H. 7 and 8), by M. Löwit. He details, in the first place, the researches of others, instigated by Stannius' well-known experiments. No agreement has yet been arrived at in explaining the effect of ligatures applied according to Stannius' direction. This uncertainty Löwit traces to the peculiar insertion of the veins into the right auricle. The figure described by the junction of the venous sinus with the heart is not situated in one plane, and cannot, hence, be accurately grasped by a ligature. The author, therefore, resorted to section with very sharp scissors with the following results :

He found, in the first place, an inhibitory apparatus in the venous sinus. Division of the sinus itself or irritation with a needle causes a *temporary* slacking of the heart's action. This effect is prevented by atropin. It is, hence, due to the irritation of some inhibitory organ, as Löwit thinks—of the vagus fibres themselves. Below the sinus no inhibitory organ could be traced. Separation of the sinus from the heart, by cutting *accurately* along the line of junction, permits the pulsations of both parts to continue, until the heart dies. As a rule, however, the auricles and ventricle beat somewhat slower than the detached sinus.

The contrary effect produced by Stannius' ligature—the stoppage of the auricle plus ventricle—is due to the fact that the ligature necessarily grasps more or less of the inter-auricular septum. If the upper portion of the septum be cut off from

the heart, previously detached from its venous sinus, the auricles (and ventricle) will either beat slower or stop altogether, according to the size of the piece removed. By cutting transversely through the auricles, the lower part of them with the attached ventricle will remain at rest definitely, unless artificially irritated. But by cutting through the auriculo-ventricular junction, *i. e.*, through the ganglia existing in the flaps forming the auriculo-ventricular valves, the ventricle will again commence pulsating, but only for a short time. When once at rest, fresh pulsations can be started by any stimulus. But if the ventricular apex, which contains no ganglia, is isolated, every stimulus evokes merely a single contraction. Extirpation of the valve-flaps containing the ganglia excludes the ventricle from further contractions. They can be extirpated by opening the lower part of the ventricle, without otherwise disturbing the action of the heart.

Löwit's views and explanations may be thus reproduced. The systole commences always in the venous sinus, as inspection shows. The sinus ganglion is, in all probability, the organ starting the impulse. The ganglia in the interauricular septum suffice for the maintenance of the auricular pulsations, but since the detached auricle beats slower, it is to be assumed that they are less irritable than the ganglia of the sinus in which the impulse is started. There is no doubt a summation of nerve energy as the impulse reaches the interauricular ganglia. The ganglia at the base of the ventricle cannot start pulsations anatomically; they must be stimulated from above. They evidently serve to transmit the nerve impulse to the ventricular musculature, as is shown by the result of their extirpation. Moreover, it has been shown (Engelmann, Bernstein) that the contraction-wave is delayed in its passage from auricle to ventricle.

THE CHEYNE-STOKES PHENOMENON.—By some casual observations Luchsinger learned that the above modification of the respiratory movements could be induced in the frog by asphyxia. Further researches which he has published together with Dr. Sokolow in Pflüger's Arch. (vol. xxiii, H. 5 and 6, p. 283), have yielded some results of high interest as regards the irritability of nerve centres. The animal's brain was asphyxiated by ligature of the two aortas. The loss of irritability follows in from one to eight hours, *the quicker the higher the temperature of the animal.*

The function of the brain is annihilated first only; subsequently

the cord loses its reflex excitability. The recovery after removal of the ligature occurs in the reverse order. Before the reflex excitability is wholly lost the Cheyne-Stokes mode of breathing can be observed; likewise on removal of the ligature it reappears immediately after the return of spinal reflexes. On watching the inspiratory movements of the larynx, it can be seen that a few inspirations occur in quick succession, followed by a long pause. During the course of asphyxia the number of inspirations in such a *group* diminishes while the pauses intervening between the groups lengthen in duration until the respiration ultimately stops. The reverse order is witnessed during recovery. The Cheyne-Stokes phenomenon does not depend on rhythmic changes in the width of the vessels as Filehne has supposed. This is indeed proven by its very occurrence while the cranial vessels are shut off. Moreover, the manometer failed to reveal any corresponding changes in the blood pressure of the frog. The phenomenon is, of course, independent of the cerebrum, and occurs just as well after its extirpation. It can occur also after destruction of the cord below the medulla and after section of the vagi.

The cause of the Cheyne-Stokes mode of breathing, Luchsinger refers to a diminished excitability of the respiratory centres, while acted upon by an intense stimulus. According to this view it seems easy to explain how the gradual increase of the stimulus—the venosity of the blood—during the narcosis of mammals, which reduces the excitability of the medulla, can produce the phenomenon, as, indeed, it does occur during the narcosis of morphia, ether, chloral and alcohol. In frogs, however, the mere narcosis is not sufficient, although the anæsthesia reduces the irritability of the nerve centres, and in consequence thereof the energy of the respiratory movements; the breathing through the skin of the frog prevents a sufficient venosity of the blood. But on substituting another stimulus, the action of picrotoxin or strychnia, the Cheyne-Stokes phenomenon can be produced in the narcotized frog.

A phenomenon similar to the Cheyne-Stokes breathing has been observed by Luciani, Roszbach and others in the frog's heart when filled with serum. It is the appearance of beats in a group with long pauses between successive groups. By analysis of the conditions the authors refer this periodicity likewise to diminished irritability and increased stimulus.

The details of Luchsinger's plausible, and, it seems to us, well-

founded explanation, are the following: By deprivation of arterial blood the nerve centres lose gradually their excitability, since the accumulated store of complex molecules, whose decomposition furnishes the force, is gradually exhausted. These and the following statements apply, according to Luchsinger, equally to all irritable tissues. The stimulus, for instance, the accumulation of waste products, must hence increase before it can evoke a response. Every *discharge*, however, of a nerve centre leaves it for a short time in a more irritable condition, as can be proven by numerous physiological instances. Hence, the first discharge of energy is followed by a group of discharges until the fatigue becomes too great. The next series of discharges can only occur, hence, by the time the stimulus has increased to a sufficient extent.

INNERVATION OF THE UTERUS.—Experiments on the above topic have been performed by Dr. G. Reni (*Pflüger's Archiv*, vol. xxiii., H. 1 and 2, p. 68) by means of the method of nerve section, a plan hitherto but little employed in connection with the uterus. Instead of watching the uncertain results of experimental irritation, the author observed whether the processes of conception, gestation and delivery, were interfered with by division of the sympathetic or the sacral nerves. As a result, he found that the functions of the uterus are not sensibly disturbed by cutting off its entire nerve supply. Extirpation even of the ganglia in the plexus surrounding the cervix, the *ganglion cervicale*, did not interfere with the uterine functions.

THE IDIO-MUSCULAR CONTRACTION is the subject of a posthumous paper by Lautenbach in the *Philadelphia Medical Times* (Sept. 25, 1880). He claims with Schiff that this form of contraction is the only positive evidence of independent muscular irritability, and that it is not, according to some German views, merely the remnant of a general muscular contraction. His experiments were made with saponin which, when dropped upon muscle in a solution of one per cent., produced a localized idio-muscular contraction merely. If the solution is carefully injected into the vessels, the muscle is often thrown into a state in which no stimulus whatever can evoke a general contraction, while tapping readily produces a limited idio-muscular ridge. He considers the effect of saponin upon muscles as identical with rigor mortis, and the latter but the last idio-muscular contraction

of a muscle. He adds that the myosin can be removed from muscles by means of a five-per-cent. solution of chloride of ammonium injected into the vessels, without altering the microscopical appearance. But after this procedure, neither general nor idio-muscular contractions are possible.

ACTION OF PRESSURE ON THE MOTOR AND THE SENSORY NERVES.—Luederitz, *Zeitschr. f. Klin. Med.*, Bd. iii (abstr. in *St. Petersb. med. Wochenschrift*, No. 42, 1880), has applied compression to the sciatic in rabbits by a ligature for varying periods of time, and found that, even after complete suppression of all conduction, the nerve returned to its normal functions on loosening the cord. This occurred four to six times in succession, by alternately tightening and loosening the ligature. He found, further, that with gradual increase of pressure the suppression of function occurred earlier in the motor nerves than in the sensory ones, so much so, indeed, that when the motor conduction was completely destroyed, that for sensation remained still intact. In some cases there was an apparent retardation of the sensory conduction at the point of compression.

These facts agree well with those of clinical observation. Vulpius remarks regarding spinal paralysis: "If there is conservation of sensibility with abolition of voluntary motility, we may say almost with certainty that we have to deal with compression." Baerwinkel and Duchenne remark in regard to peripheral paralysis, that the presence of sensibility, even if weakened, is a very favorable circumstance as regards prognosis.

THE VASO-DILATOR NERVES.—At the session of the Société de Biologie, July 17, 1880 (rep. in *Gaz. Des Hôpitaux*, No. 86), M. Laffont, continuing his investigations on the vaso-dilator fibres contained in the different peripheral branches of the trigeminal nerve, announced that, as he had shown to the society on the 17th of January, he had succeeded in dividing simultaneously within the cranium the facial and the accessory nerve of Wrisberg, the trigeminal between the gasserian ganglion and the pons Varolii, and one month later the excitation of the peripheral ends of the buccal, lingual and superior maxillary nerves of the same sides produced as strong a congestion of the mucous membrane on the side operated upon as on the other.

The *post-mortem* examination showed that the intracranial division of the trigeminus had been successful.

Thus it appears that the vaso-dilator nerves in the various peripheral divisions of the fifth nerve do not arise in the roots of this nerve, nor do they arise with the facial, as has been shown independently by MM. Laffont and Vulpian; they can therefore only come, as M. Laffont justly thought, from the glosso-pharyngeal, by way of Jacobson's nerve. The very elegant experiment of M. Vulpian, faradization of the tympanic caisson causing rubefaction of the buccal mucous membranes of the same side, supports this theory.

M. Laffont, wishing to test the origin of the glosso-pharyngeal, applied the excitation through the foramen lacerum posterior and obtained the same results.

In order to definitely test the matter, it is needful to perform the complete extirpation of the glosso-pharyngeal in such a way as to interrupt the communications between Jacobson's nerve and the other branches. Unfortunately, this is impracticable in adult animals, and M. Laffont employed very young puppies and kittens. Wishing also to study this point in a comparative physiological way, he studied the mechanism of the erection in the comb and wattles of the cock. He observed that excitation with a weak faradic current of the peripheral end of the ophthalmic nerve, which innervates the comb (by the intermediation of nerves analogous to the suborbital branches of mammals), caused rubefaction and turgescence of the comb on the side of the operation. Excitation, also, of the peripheral end of the inferior maxillary nerve, which innervates the jugular wattle (through fibres analogous to the mental branches of mammals), caused turgescence and erection of the corresponding wattle. The same nerve fibres, therefore, have the same functions in these two classes of animals, birds and mammals.

Is the origin of the dilator fibres the same? Do they arise in birds, as in dogs, from the glosso-pharyngeal? To ascertain whether this is the case M. Laffont exposed the glosso-pharyngeal nerve in a cock, at its exit from the occipital, where it is easily isolated from the superior cervical ganglion with which it is intimately connected.

The excitation of this nerve caused immediate erection of the comb and the corresponding wattle.

This last experiment, according to M. Laffont, ought to explain the observation of Legros in 1866, that the extirpation of the

superior cervical ganglion in a young cock hindered the growth of these erectile appendages. This fact, that extirpation of a sympathetic ganglion arrested the nutrition of an organ, was in flagrant opposition with Cl. Bernard's discoveries in regard to the functions of the sympathetic. M. Legros, therefore, thought to explain it by attributing a different vitality to erectile from that of other tissues. But anatomical examination shows that, even in the adult, the small superior cervical ganglion is *very closely joined to the glosso-pharyngeal nerve*, and cannot be removed without damage to this nerve. It is, therefore, altogether improbable that in the young animal this ganglion can be removed without destroying the nerve also. Under these circumstances, Legros practically only performed on birds the same experiment as M. Laffont made on mammals; he destroyed the vaso-dilator nerves, and thus abolished the principal function of the erectile tissues.

It also happened that Nuchon, experimenting, at nearly the same time as Legros, on the adult animal, in whom the ganglion is more distinct and can with care be separated without too serious damage to the nerve, obtained results contradicting those of the latter observer.

THE VASO-DILATORS OF THE BUCCO-LABIAL REGION.—At the session of the Soc. de Biologie, October 24th (rep. in *Gaz. des Hôpitaux*, 1880, No. 126), M. Laffont recalled that he had reported to the society the fact that the vaso-dilator fibres contained in the trigeminus did not arise from the nucleus of origin of that nerve, but were merely acquired fibres, the origin of which is still unknown.

Nevertheless, in a note to the Acad. des Sciences, August 16th, MM. Dastre and Morat had accused MM. Jolyet and Laffont, of considering the fifth nerve as a typical vaso-dilator. In the same note, these physiologists claim to have discovered the origin of the vaso-dilators of the buccal region in the thoracic sympathetic. With this view, they are content to examine the effects produced by excitation of the cervical sympathetic; but, as Cl. Bernard has said, it does not suffice to merely irritate a nerve to attribute to it a certain function; it is needful, also, to divide it and see whether in these new conditions its function persists in its integrity. This has been done by M. Laffont; he extirpated the superior cervical ganglion in a dog and resected the cervical vago-sympathetic on the same side. Twenty days later, he ob-

tained the same effects of vaso-dilatation in the bucco-labial region on the same side and that of the resected sympathetic, by exciting the two superior maxillary nerves.

The origin of the vaso-dilator nerves of this region is not, therefore, in the cervical sympathetic, as announced by MM. Dastre and Morat. There is, then, only a reflex action that has also been studied by M. Laffont.

He exposed the circle of Vieussens in a dog, the afferent branch of the inferior cervical ganglion, that of the superior cervical ganglion, and the occipito-atloidean space. Then he found that excitation of the circle of Vieussens and of the cervical sympathetic, caused bilateral redness of the bucco-labial region, only predominating on the side of the excitation when the current was strong.

Opening the occipito-atloid space, he hooked on through the posterior foramen lacerum, without injuring the medulla, to the glosso-pharyngeal, spinal, pneumogastric, and hypoglossal nerves, rupturing them in withdrawing the hook. Then exciting again the circle of Vieussens, he met with no more vaso-dilator effects, while the oculo-pupillary ones persisted, thus proving that the reflex arch being interrupted, the reflex failed to occur; but if, in these new conditions, the excitation is applied to the peripheral portion of the divided nerves, placing one electrode at the foramen lacerum and the other to the periphery, we obtain vaso-motor effects limited to the side excited.

Conclusions.—The results announced by MM. Dastre and Morat, correct as far as they go, have received from these observers an erroneous interpretation; they have not discovered the vaso-dilators or their origin, but only a new reflex action on these vaso-dilator nerves.

At the same session M. Mathias Duval presented, in the names of MM. Dastre and Morat, a note on the same subject. In the course of their experiments they had observed the effects of ablation of the superior cervical ganglion and section of its various branches, especially the principal intercarotidean filaments. These effects they had noted at various periods of time after the operation; four days, eight days and three weeks. Some survived two months.

Among the more interesting phenomena one was especially noted. They tore away in a dog the superior cervical ganglion, leaving the vagus. The animal recovered very quickly, and ate and acted naturally, even the evening after the operation. Eight

days later it was slightly curarized, and the vago-sympathetic was divided on the side of the former operation. The cephalic portion being irritated, the usual effects were not observed; the buccal vaso-dilatation, as was expected, did not occur. The remarkable fact, however, was that of a very beautiful reddening of the opposite side. If the ganglion was extirpated on the right side, the dilatation occurred on the left. To show the route by which this effect was produced, it was sufficient to cut the vago-sympathetic of the left side also, and then renew the excitation, and the vaso-motor flush occurred on neither side. This, MM. Dastre and Morat claim as a new proof, that the dilatation is due to the sympathetic, since, they say, this being cut, the vaso-motor phenomena cease on the side operated upon, and the crossed or reflex action on the other side also ceases when the sympathetic is cut on that side also.

It still remains to be explained why the phenomenon, lacking in the uninjured animal, appears after ablation of the ganglion. In any case, this zigzag reflex is very significant in point of view of our knowledge of the reflex routes in the medulla and cord. MM. Dastre and Morat offer the fact with the immediate conclusion it justifies, reserving its complete interpretation and its consequences.

THE TERMINAL DISTRIBUTION OF THE NERVES IN THE UTERINE MUCOUS MEMBRANE.—Prof. Schröder, of Berlin, furnished Dr. Patenko with the freshly excised uteri of five women, and the latter has utilized this material for studying the nervous termination in the mucous membrane. Dr. Patenko states that in all these cases the operation was undertaken for primary causes, but the malignant disease never extended above the os internum; and the microscopical and minute appearance of the uterine mucous membrane was always perfectly normal. He employed chloride of gold and osmic acid in solutions having a strength of 0.01 per cent. to 0.5 per cent. Portions of the specimens were subsequently placed in 96 per cent. alcohol, and used for thin sections. Other preparations were made by tearing small bits of tissue in the solutions mentioned. He makes a provisional statement of the results of his examinations. By suitable manipulations he succeeded in isolating some of the uterine glands, and a beautiful reticulum of delicate non-medullated nerve fibres was seen in connection with the membrana propria.

This network was situated above the external surface of the glands, and minute filaments were seen to proceed from it into the interior of the glands. These extremely delicate fibres were found between the endothelial cells of the *membrana propria*, or in the glandular epithelial cells. Their ultimate termination in the latter was not positively ascertained. The nodular points of the surface reticulum frequently showed small nerve cells. The author believes that this network takes its origin from the nerve fibres which course in the muscular substance of the uterus, and, accompanied by some intermuscular connective tissue, proceed to the boundary line of the mucous membrane. (*Centr. f. Gynäk.*, Sept. 11th. *N. Y. Med. Record*, Nov. 27, 1880.)

THE DETERMINATION OF THE POSITION OF OBJECTS IN SPACE.—At the session of the Boston Society of Medical Sciences, Oct. 21, 1879 (reported in *Boston Med. and Surg. Journal*, Nov. 11th), Dr. H. P. Bowditch spoke briefly of some experiments which he had made bearing on the question as to the *relative degree of assistance which we get from our sense of touch and muscular sense, and from our sense of sight, in the determination of the position of objects in space.*

It would seem, at first glance, as if the delicacy of the visual sense were much greater than that of the tactile sense; yet, as a matter of fact, we constantly use the latter in connection with the so-called muscular sensibility to correct the former; thus in detecting the flaws in a piece of nice joiner's work.

Dr. Bowditch's own experiments were to study the point whether the use of the sight or of the muscular sense best fixes the exact position of an object in the memory. To this end he had brought a small glass bead into different positions on the table, at times with the eyes open, but without placing it with the hand; at times with the eyes closed, while the finger was used to place the bead, and had then tried under which of these two conditions he was best able to locate the bead subsequently with the end of a knitting-needle, the eyes of course being closed. The results were as follows:

Location by touch: minimal error, 8 mm.; maximal error, 38 mm.; average, 19 mm.

Location by sight: minimal error, 8 mm.; maximal error, 33 mm.; average, 11.4 mm.

Dr. Bowditch observed that he was well aware that it was not exact to speak of the sense of sight in these experiments, since in reality the tests principally concerned the ocular muscles.

Another method, not yet tested, would be to try comparative estimates of size of objects by the use of sight and of touch.

In the discussion that followed, Dr. Blake suggested that the best form of object for this purpose would be a raised circle, round which the finger should be carried, since with small objects more could be felt than would be exposed to sight from any one point of view.

Dr. Hay spoke of various conditions which modify the judgment of the eye, as whether a line is horizontal or perpendicular, etc.

Dr. James said that these observations of Dr. Bowditch brought to mind the experiment of Helmboltz, who found that his ability to reconverge his eyes upon an object (finger) held up before him was increased if before opening his eyes he touched the object with his finger.

Dr. Bolles spoke of the degree to which education (which may be excessively rapid) comes into these problems as a complicating factor ; as for example in the case of type-setters.

The delicacy of muscular sense, as compared with sight, is shown in the ease with which we move a slide under the microscope through the minutest distances.

Dr. Wadsworth thought it would be hardly fair to compare the efficiency of sight with that of touch in estimating the size of objects, since our very notion of size and distance requires the use of both senses, one to supplement the other. Certainly by sight alone we could acquire no idea of distance.

Dr. Bowditch admitted this as regards sight, but said that with touch alone (including muscular sense) it is manifestly possible to acquire quite accurate notions of distance, as in the case of the blind. Dr. Bowditch further suggested that behind education there might be anatomical and physiological reasons for the greater accuracy of different sets of muscles ; as, for instance, the varying richness of their nerve supply.

Dr. Dwight thought that the importance of this point could be overrated. The abducens oculi, for example, receives a larger supply of nerve fibres than any of the other ocular muscles, yet its functional power is not greater than theirs.

Among others, the following have been recently published on the anatomy and physiology of the nervous system :

RAGOSIN and MENDELSSOHN, Graphic Investigation as to the Movements of the Brain in the Living Man. *St. Petersb. Med. Wochenschr.*, Sept. 25th. DEBOVE and GOMBAULT, On the Sensory Decussation in the Medulla. *Arch. de Neurologie*, I, July, 1880. OTT, The Dilatation of the Pupil as an Index of the Path of the Sensory Impulses in the Spinal Cord. *Jour. of Phys.*, II, v and vi, July, 1880. GRAY, The Physiological Anatomy of the Cord and the Motor Tract of the Cerebrum. *Ann. Anat. and Surg. Soc. of Brooklyn*, Oct. WESTPHAL, On Paradoxical Muscle Contraction. *Centralbl. f. Nervenheilk.*, Oct. BUFALINI, On the Preparation of the Cylinder Axis of the Nerve Fibre. *La Sperimentale*, Nov. SPITZKA, A Remarkable Peculiarity of the Anthropoid Brain. *Science*, July 17th.

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND,
AND PATHOLOGICAL ANATOMY.

NEURITIS.—Leyden, *Charité Annalen*, Bd. v. (abstr. in *St. Petersb. Med. Wochenschr.*, No. 44), after the report of a case of multiple neuritis ending fatally in ten months, gives the following general data as to the pathological anatomy and symptomatology of the disorder :

I.—Pathological Anatomy of Neuritis.

1. *Simple acute neuritis or perineuritis*, characterized by swelling, hyperæmia and hemorrhage of the sheath. This form is at the bottom of many neuralgias, and marks itself by its changeability and tendency to extend itself. In it there is no nuclear proliferation or degeneration of the nerve substance.

2. *Chronic perineuritis*, consisting in thickening of the sheath without disease of the nerve, may exist without showing itself by any symptoms, but may also cause, occasionally, severe pain. To this form belong the chronic neuritis nodosa and the eccentric neuroma formations.

3. *Degenerative neuritis* (parenchymatous neuritis of Joffroy) leading to atrophy of the nerve with thickening of the nerve sheath, myositic muscular atrophy, and pigmentation of the muscles.

This form may occur *primarily*, as (*a*) traumatic (Erb) ; (*b*) rheumatic ; (*c*) saturnine (lead paralysis) ; (*d*) degenerative neu-

ritis in acute diseases; (*e*) acute multiple neuritis; (*f*) diffuse neuritis found by Eichhorst in acute ascending paralysis, and by Dejerine in diphtheritic paralysis.

As *secondary* degenerative neuritis are to be reckoned (*a*) the descending neuritis with myositis connected with acute softening of the spinal cord; (*b*) the degenerative neuritis of chronic myelitis; (*c*) the acute ascending neuritis, a form not esteemed as fully established by Leyden, but one accepted by those authors who consider progressive muscular atrophy as a peripheral myositis advancing upward toward the cord.

II.—*Symptomatology of Neuritis.*

1. *Sensory symptoms.* Hyperæsthesia and tenderness, spontaneous tearing pains as well as pain on pressure or movement; the later occurring contractures are, at least in part, results of the increased sensibility. With these appear moderate anæsthesia, indistinctness of tact sense.

2. *Motor symptoms.* Paralytic motor disturbances, with later muscular atrophy, and, where this does not recover, degeneration reaction.

3. *Edematous swelling* at the locality of the neuritis—a rather rare but very valuable symptom, perhaps connected with sanguineous infiltration.

4. *Trophic symptoms.* Fragility of the nails; excessive growth of hair. (Articular and cartilage affections were lacking in Leyden's cases.)

The extent of the symptoms corresponds to the nerve tracts involved.

Leyden expresses himself with much reserve in regard to the diagnostic significance of the degeneration reaction; he seems inclined, in those cases in which it appears in connection with poliomyelitis, to explain it by the secondary descending degenerative neuritis which accompanies this disease, and believes, indeed, that many cases described as poliomyelitis really belong to the class of multiple neuritis.

The tendency of neuritis to extend itself is especially marked with the neuralgic acute forms; it is less so with the degenerative forms. The former, which practically consists only in hyperæmia and swelling of the connective-tissue envelopes of the nerve, more readily attacks the cord, but is there limited to the envelopes. The degenerative form is more apt to pass downward to the periphery, where it leads to muscular atrophy through myositis (inflammatory proliferation of nuclei with pigmentation).

PARALYSIS OF ALL THE OCULAR NERVES.—Dr. H. Bresgen, of Kreuznach, reports in the *Deutsche Med. Wochenschr.* the following case: On September 2, 1875, he saw, for the first time, a well-formed and nourished and previously sound female, aged 25, who had been seeing double for a few days. The trouble was evidently due to paralysis of the right abducens. In the following spring, bilateral ptosis appeared, with slow but steadily advancing paralysis of all the muscles of the left eye, so that all movements were impeded. In the meanwhile the vision was unimpaired; also the pupillary reaction and the accommodation. The ophthalmoscope revealed nothing abnormal. The eyelids could be only partially closed. The patient's condition continued to grow worse till, in the beginning of 1879, both eyes were completely paralyzed, the ptosis more marked, and the eyelids could not be brought together. Speech was also much altered, though the lips and tongue were freely movable and nothing abnormal was observed in the palate; the voice was strongly nasal and the labials B and P could not be pronounced. Together with these symptoms appeared difficulty in swallowing, and noticeable emaciation. The movements of the iris and the accommodation remained perfect. By the commencement of the year 1880, the symptoms of bulbar paralysis had so advanced, together with general emaciation, that the patient could no longer be understood; the upper branch of the facial was also paralyzed, but the pupillary and accommodation movements were still perfect. Death occurred early in February.

Though a *post mortem* was not performed the clinical history indicated a combined paralysis of the two oculo-motor, trochlear, and abducens nerves, together with the upper branches of the facial, occurring before the dysphagia and alalia revealed the general bulbar paralysis. It indicates, also, very clearly, a lesion of some kind in the floor of the fourth ventricle and the aqueductus Sylvii, involving the angle of the facial root, the trochlear nucleus, and the fibres of origin of the motor oculi, except its most anterior fascicles. Hence the normal pupillary reaction and accommodation, which are incompatible with total paralysis of the third nerve, Graefe to the contrary notwithstanding, as has been shown by Volkers and Hensen, whose conclusions Dr. Bresgen quotes.

THE RELATION OF THE NERVES TO ANEURYSM.—Lewaschow, *St. Petersb. Med. Wochenschr.*, August 14th, publishes the account

of some researches, undertaken by himself in Botkin's laboratory, for the purpose of ascertaining the effects of the nerves on the nutrition of the blood-vessels, and their relations to the production of aneurysm. The subjects of his experiments were dogs and cats, and he chose the nerves of the posterior extremity for his operations. After exposing the main sciatic of the limb, he irritated it with dilute acid, taking all precautions to avoid disturbing its surrounding tissues. Then the wound was closed and left alone for four to six days, then the operation was repeated, and so on, till the death of the animal. Immediately after the operation, the temperature of the limb operated upon rose, and, as a rule, continued higher than that of the other corresponding limb. Sensibility was not much disturbed in successful cases; the bodily temperature was only slightly increased. Death occurred rapidly in a few cases from gangrene of the operated limb; others survived several weeks, dying of dysentery or putrid infection, and some, as much as two months, and these last are the ones from which he draws his conclusions.

Part of the animals exhibited no other consequences of the operation than those mentioned above. Others, however, after a longer or shorter period, developed convulsive phenomena, very closely resembling epilepsy, occurring at first but seldom, but increasing in frequency as time passed, so that some died in almost continuous convulsions.

The section showed in the above animals results approximately alike, and the more pronounced, as a rule, the longer the time since the irritation of the nerve had been begun. The thigh of the operated side was more or less atrophied, the lower leg and foot hypertrophied, and inflammatory swellings, etc., on the skin, elsewhere than where the nerve was exposed. The nerve itself was noticeably thickened, reddened and grown to the adjacent tissues. The arteries exhibited, especially at the junctions of the smaller branches with the main stem, moderate-sized swellings, yellowish-white in color, sometimes also dirty-red in comparison with the other portion of the inner wall of the vessel.

The microscopic appearances of the vessels of both the limb operated on and the corresponding sound one were compared. Besides those appearances already described as observable microscopically, there were found marked changes in parts apparently healthy on naked-eye observation. These consisted chiefly of a noticeable infiltration of the adventitia, and partly also of the media of the vessels, with round and elongated cells. These alter-

ations toward the periphery resembled more a gradual increase of the cell elements; toward the centre they took more the character of an infiltration.

Lewaschow also experimented by extirpating the lower cervical and upper thoracic ganglia, in order to ascertain whether it would cause any alteration of nutrition in the large vessels of the thorax. Though the experiments were not altogether satisfactory on account of the animals dying too soon, there were found quite pronounced inflammatory alterations in the aorta, especial at the points where the branches were given off. Still, the general phenomena of pleuritis and pyæmia which accompanied these alterations, made it difficult to speak positively as to their cause. He is still continuing the investigations on these points.

LOCOMOTOR ATAXY.—Dr. George Fischer, *Deutsch Arch. f. Klin. Medicine*, Bd. xxvi, p. 83 (abstr. in *Deutsche Med. Wochenschr.*, No. 38, 1880.)

I. The author calls attention to a peculiar connection between the patellar reflex and conduction of painful impressions in locomotor ataxia. Out of nineteen cases examined, there was retardation in fifteen, and normal conduction in four, in the lower extremities, and in these last he still found the tendon reflex, and normal condition of the bladder, both of which were lacking in the others. One case, which formed the transition between the others, exhibited a peculiar condition; on one side there was impaired tendon reflex and pain-conduction, and on the other, the normal conditions. On physiological grounds, he thinks that in these cases, with the normal tendon reflex and conduction, the morbid process is confined to the posterior columns without implication of the gray substance.

II. A symptom first described by Leyden and more recently mentioned by Remak, is the separation in time of the perceptions of tact and pain in simple prick with needle. It indicates a simple diminution of the cross section of the gray substance with still functioning posterior columns. Among the fifteen cases with retarded pain-conduction, Fischer found this double sensation in eight. The examination for this phenomenon revealed a curious anomaly in the cutaneous reflexes. The normal reflex acts, as is well known, according to Pflueger's law along the motor nerves from that point of the cord where the sensory nerves excited join it. With stronger excitations it reaches still higher spinal cen-

tres, and motor nerves are involved which arise from points in the cord much higher than the junction of the irritated sensory nerves. With very strong excitations, through the medium of cerebral sensibility, a centrally-started reflex may take place, closely resembling voluntary movement. The author observed various complications of reflexes and retardations in tabes :

1. Two cases of retarded pain-conduction without double sensation and without any reflex ; the first had pronounced hyperalgesia, and the second, muscular paresis. The lack of reflex activity was, in the first case, based upon disease of the central portion of the reflex arch ; in the second, on disorder of its peripheral portion.

2. Three cases of retarded pain-conduction without double sensation showed reflexes combined with conscious voluntary reaction. The spinal reflex act is the product of a cerebral transmission process.

3. One case of retarded pain-sense without Remak's symptom gave a reflex synchronous with the prick. The sensory excitation thus reached the normal spinal reflex centre.

4. Two cases of retarded pain-sensation with Remak's double sensation symptom gave reflexes synchronous with the consciousness of pain. The primary reflex arch in these cases was out of order, and the reflex must be considered as having a cerebral origin.

5. In one case with retarded pain-sense and double sensation the reflex occurred at the same time as the prick and the corresponding tact sensation. This corresponds with normal reflexes as in 3.

6. In some cases with retarded pain-sense and Remak's double sensation the reflex occurred both at the point of contact and tact sensation, and at that of pain. In these cases the first is the spinal reflex, and the second is cerebral.

Of course, these varieties do not include all cases ; there is every variety of transition between them.

III. In some patients the author discovered a remarkable condition of the sense of locality. With simple contact of one point of the æsthesiometer, they felt the sensation of two, and with both, that of four or five points (polyæsthesia). The explanation of this is not clear. There is possibly an abnormal irritability of the gray substance, so that a wave of irritation entering a ganglion cell of the posterior horn extends itself, not merely in a central direction, but laterally through the fine nervous network, and

is diffused into neighboring ganglions, which are connected with other centripetal routes from the periphery. This would produce to consciousness the impression of contact at each of these points connected with these ganglion cells. In this manner, the author explains the case of two patients who, when brisk contact-impressions were produced on one leg, always felt it also in the other.

MM. Debove and Boudet, of Paris, *Archives de Neurologie*, i, p. 42, experimenting with a new apparatus, the myophone, invented by one of themselves, which gives the sound of the muscles in contraction and at rest, found a decided inequality in the tonicity of different groups of muscles in ataxics, which had begun to display the symptom of incoördination. It was not noticeable in those cases characterized only by the frequent pains of the incipient stages of the disease. They explain the incoördination of this disease by this lesion of tonicity, which in turn is accounted for by the disease of the posterior roots, as the section of these, experimentally, in animals, produces locomotor troubles referable to loss of muscular tonicity. They cannot, in those cases, be assimilated to those of ataxics, because in the latter we have only inequality of tonicity, not complete loss of tonus; but the principle is the same in both. MM. Debove and Boudet notice briefly the theories of the incoördination in tabes: that of Tschiriew who attributed it to loss or diminution of muscular tonus; that of Pierret, who considered it to be caused by limited muscular paralysis; that of many authors, who have considered it due to loss of general sensibility; and after an analysis of the facts of the movements of ataxics, conclude that "the incoördination of tabetics is due to an unequal tonicity of their muscles, the effects of which are diminished by the maximum contraction of these muscles."

They do not refer to the idea largely held, and which seems to us rational, that the loss of the muscular sense has much to do with the incoördination. We are still inclined to attribute it, in part at least, to this deficiency.

FUNCTIONAL ISCHÆMIA OF THE BRAIN.—Prof. Ball, of Paris, read a paper, at the last meeting of the British Medical Association, on this subject, which is given in full in the *British Medical Journal* of October 30th. In it he relates and discusses three interesting cases, which may be summed up as follows: The first

was a young man of good character, married, temperate, who, after giving way to a fit of passion, was suddenly struck deaf and dumb, with hemianæsthesia and slight motor paralysis on the left side. Speech was recovered in eighteen hours, but the other symptoms continued twenty-two days, suddenly disappearing after a few galvanic applications applied to the posterior part of the left forearm. The patient's health was previously good, but the year before he had been suddenly struck blind on the left side, and only recovered his vision after the lapse of a month. The intellectual faculties were always intact.

The second case was that of a cab-driver, æt. 33, strong, healthy, and of sober habits. He was married and of an easy, cheerful disposition. In December, 1879, he had an attack of acute rheumatism, and immediately after his recovery resumed his work, being at the time exposed to intense cold. On February 24th he had a severe attack of vertigo, and the next day came home in a peculiar condition, which still continued on his admission to the hospital, March 1st. He was in a sort of mental stupor, could not answer the simplest questions, but repeated them automatically; nor could he attend on himself in the simplest matters. He was completely hemianæsthetic and paretic on the right side. He gradually improved, however, without any specified treatment except an abortive attempt to use mercury and iodine, which had to be discontinued on account of the unpleasant effects of the latter, and on April 30th he was discharged, suffering only from a defect of memory. The motor power was recovered earlier than the sensory. There was afterward noticed a tendency to the recurrence of some of the symptoms for a short time in the evening.

The third case was somewhat like the first. A man, aged 45, suddenly became aphasic in a fit of anger. The difficulty seemed to be due to a spasm of the tongue during the attempt to speak; there was no paralysis, and all other functions were normal. Recovery took place suddenly without treatment.

The explanation of all three cases given, is that there was a local vaso-motor ischæmia of those parts of the brain that have to do with the functions observed to be disturbed in each case. In none of the cases was there any heart disease discovered. It would have been easy to increase the number of facts, but it was thought important to exclude all possibility of the charge of hysteria, and therefore the cases selected to report were only those of strong, healthy laboring men, against whom this charge

could not be raised. Prof. Ball deduces from these facts the following conclusions :

1. Spasmodic contraction of the brain-vessels may be produced by moral impressions, fear, anger, or grief, and also by the prolonged action of severe cold.

2. All the symptoms of organic injury of the brain may be created by functional ischæmia.

3. Mental disturbances of a peculiar kind, and especially lowering of intellectual power, as apart from positive insanity, may be the result of this process.

4. Spasmodic contraction of the brain-vessels, when once induced, may persist for a considerable length of time without producing structural changes in the nervous centres.

5. This morbid condition may, in certain cases, suddenly disappear, while it is not unreasonable to suppose that the converse may be equally true, and that the symptoms may culminate in rapid or even sudden death.

FATIGUE AS A CAUSE OF EPILEPSY.—Dr. B. Saloman, of Coblenz, *Deutsch. Med. Wochenschr.*, Nos. 34 and 35, as a frequent cause of the epileptic attacks sometimes observed in persons otherwise sound and without any hereditary or other predisposition to nervous disorder, suggests mental or physical overstrain, especially the latter. He claims the functions of the nervous centres may be interfered with by muscular over-exertion in several ways, viz. : 1, by the blood circulating in them containing an excess of carbonic acid, and a deficient quantity of oxygen ; 2, by the brain being inadequately supplied with oxygenated blood on account of the heart being unable to overcome sufficiently the increased resistance caused by the general muscular contraction ; and 3, by the heightened reflex irritability of the brain due to the continuous irritation of the sensory nerves passing through the contracted muscles.

Muscular activity consumes oxygen and causes formation of carbonic acid, which is ordinarily gotten rid of by increased action of the lungs. But when, as in marching soldiers, the chest is embarrassed by a heavy pack, and the abdomen compressed by the sword belt, this cannot be always effected even with increased frequency of respiration. The circulation of the brain is also interfered with in other ways, by the pressure of the cravat or stock, and these, together with the altered and abnormal con-

ditions and mode of life, will serve to account for such cases when they occur in soldiers in active service or engaged in vigorous practice drill and manœuvres in time of peace. But they occur also frequently in civil life under analogous conditions, and Dr. Saloman gives brief accounts of a number of cases. They generally occur in youthful and physically not very robust individuals, who have been for one cause or another subjected temporarily to excessive fatigue.

The prognosis of these cases is relatively favorable; the epilepsy does not have very much tendency to become chronic, if the conditions are not unfavorable.

NEURASTHENIA.—Dr. C. H. Hughes, in the *Alienist and Neurologist* for October, publishes an article on neurasthenia, mainly consisting of excerpts from a report by Dr. Van Deusen of the Michigan Asylum in Kalamazoo, published first in 1868. In that paper, Dr. Van Deusen described and discussed quite fairly the symptoms of a large number of neurasthenic cases, and, fully recognizing the condition, named it neurasthenia. To him, therefore, as much as to Dr. Beard, belongs the honor of identifying and designating the disease.

It should be also generally known, however, that the condition has been recognized and its symptoms noted for more than a century by various writers, among whom we may mention Whytt, Swann, Frank, Stilling, etc., not to mention a host of more recent authors, and the term "neurasthenia" itself is alluded to by Dr. Beard in one of his earlier papers on the subject as an "old and almost forgotten term."

PARALYSIS OF THE BLADDER.—At the session of the Verein für Natur und Heilkunde, Dresden, February 21, 1880 (rep. in *Deutsche Med. Wochenschr.*, October 23d), Dr. Erdmann read a paper on paralysis of the bladder of which the following abstract is given.

After the speaker had given, at the beginning of his lecture, the innervation relations of the bladder both from an anatomical and a physiological standpoint, and had especially described the act of urination (according to Goltz's researches) as a reflex mechanism, and the importance of the lumbar spinal reflex centre for this function, he turned to the neuroses of the bladder, so far as these

are not connected with anatomico-pathological alterations that bring them into the province of surgery. Amongst them are to be distinguished neuroses of motility and neuroses of sensibility. They include :

1. *Vesical hyperæsthesia*. This is observed especially among those given to sexual exercises and to onanism in particular. A moderate distention of the bladder produces a strong impulse to urination, and, if this is not met, a severe pain in the penis. Vesical hyperæsthesia is also a consequence of a morbidly altered condition of the urine, sometimes when this alteration is scarcely perceptible, as, for example, after drinking too fresh beer.

2. *Vesical anæsthesia*. There are individuals who, without experiencing any desire to urinate, allow the bladder to become largely distended, and who, nevertheless, cannot be considered as diseased. When this condition is long continued, however, it leads to paralysis of the detrusor muscles and retention of urine.

The nocturnal enuresis of children also, perhaps, belongs in this category, if we are to consider it as due to an imperfect anæsthesia of the sensory nerves of the bladder. The sensation produced by fulness of the organ is felt, but not strongly enough to awaken the child from normal sleep. Urination then occurs as an involuntary reflex. The author recommends against this very unpleasant infirmity a tonic and electric treatment, and attributes much value to psychic and moral agencies without physical correction.

Among the neuroses of motility belongs vesical cramp. Under this designation we ought to include only those abnormal irritative conditions of the motor nerves of the bladder that are independent of visible structural disease of the vesical walls. Thus, foreign bodies, especially calculi, in consequence of the irritation they produce on the lining of the bladder, cause violent contractions of the muscular walls.

The most frequent causes of this spasm, however, are either psychic irritations, such as fright or shock, or reflex irritations caused by irritative conditions of neighboring organs such as the uterus, the rectum, etc., or they may be due to hysteria. They may involve the detrusor muscles or the sphincter of the bladder, producing, as the case may be, enuresis spastica, dysuria spastica, or ischuria spastica.

Turning now to paralysis of the bladder, the author showed how it might involve either the detrusors or the vesical sphincter, or both antagonists together in some cases. He stated also, that the contraction of the expelling muscles is not under the control

of the will, but is excited by the reflex irritation of the contained urine, while that of the sphincter is governed by volition. Disturbances of the innervation of the bladder may be caused :

1. By functional or structural disorder of the brain, as well as by severe febrile conditions in which the cerebral functions are depressed. In these cases paralysis of the sphincter is most frequently observed, since the will is suppressed or weakened, while the reflex expulsive impulse is still active.

2. By spinal lesions.

3. Through alteration of the peripheral extensions of the motor and sensory nerves of the bladder themselves, through which they lose their irritability. To this group belong the so-called myopathic paralyses of the bladder. They are produced by fine texture changes of the muscular fibres and their contained nerve-terminations. Frequently, perhaps, the cause of this disease is only excessive dilatation of the bladder arising from some mechanical obstruction to urination, or from a false feeling of modesty. A vesical catarrh also, which itself is the consequence of numerous other disorders, such as those of the urethra, may be the cause of the muscular structure of the bladder becoming diseased and lead to its paralysis. After noticing briefly the symptoms, the author of the paper passed to the treatment of these conditions :

Internal medication with narcotics, such as opiates, belladonna, etc., is often very useful in disordered conditions of the bladder, but in paralysis of the viscus a cure is never thus produced. Medicines are only useful as prophylactics to ward off cystitis. Among them he mentioned Vichy and Wildunger waters, chlorate of potash, benzoic-salicylic acid, etc. In retention the catheter must be faithfully employed to keep the urine drawn off, and attention should be given to its cleanliness. Sitz baths and recipients are urgently required if incontinence exists. A good urine receiver for night use is a desideratum. In general, the author promised best results from the use of electricity, especially in cases of atony and weakness following excessive distention of the bladder or vesical catarrh. He recommends the most direct possible faradic excitation of the vesical walls, so as to arouse its sensory nerves and produce reflex contractions. Faradic irritation causes energetic contractions if a sound-shaped electrode is used, isolated by rubber to its point, in the previously emptied bladder, and the other electrode is introduced into the rectum. Usually, it is sufficient to place one on the symphysis and the other on the sacral region.

Galvanic applications should be made only externally, since they may cause electrolytic and caustic effects on the lining mucous membrane. Dr. Erdmann recommends the application of the anode to the occiput and the third lumbar vertebra (the reflex centre) and the cathode to the symphysis or perineum. Fifteen to twenty elements for from two to four minutes, and separate strong induction shocks.

HYSTERIA MAJOR.—Dr. Wm. J. Morton in a communication to the *N. Y. Medical Record*, Oct. 2, describes a typical case of hystero-epilepsy in one of Charcot's wards, who was only kept from recurring attacks by continuous mechanical pressure over the left ovary, and ends his letter as follows :

"And what is the practical bearing of this study, conducted now for several years with so much care by Prof. Charcot? The practical value of this work lies in having taken up the hitherto confused story of hystero-epilepsy, and in having brought order out of chaos ; in having marshalled into line under a simple law, whose immutability is at once recognizable, the diverse phenomena of the disease ; in having shown, in short, that in accordance with this law, all the symptoms of hystero-epilepsy could be marshalled into groups, and that each group was related to another in an invariable order of succession and development. It is this analysis which established that what was at first glance so evidently epileptic was epileptic only in outer form, just as is the case in certain other diseases of the nervous system where convulsions are epileptoid without being epileptic.

"The term hystero-epilepsy, then, is a misnomer ; there is no epilepsy present. The disease is really, as we have already intimated, hysteria major, while the hysteria of every-day practice must be called hysteria minor,—the one the fully developed disease, the other rudimentary. Knowing the completed pattern of a hysteria-major, it is easy to fit into their proper places the fragmentary and detached phases of a hysteria minor. Here, then, in this nomenclature, this division of hysteria into major and minor, lies a great advance. Not only has hystero-epilepsy become an intelligible disease, but in becoming hysteria major it has thrown a brilliant light upon ordinary hysteria, and rendered its manifold phases clearer to the practising physician."

THE SYMMETRICAL NEURALGIAS OF DIABETES.—At the session of the Paris Academy of Medicine, Sept. 10 (rep. in *Le Progrès*

Médical), M. J. Worms read a paper on the symmetrical neuralgias in diabetes. He thought that in a subject so obscure as that of diabetes, no new facts should be neglected. He therefore presented the points suggested by two cases of neuralgia in the sciatic and inferior dental nerves of both sides, which he had come across in diabetic subjects. These had not been previously described as symptoms of this disease.

He drew the following conclusions from these cases :

1. There is a special form of neuralgia connected with diabetes, characterized by appearing in the two symmetrical divisions of the same pair of nerves.
2. Up to the present time this has been observed in the sciatic and dental nerves.
3. Diabetic neuralgia appears to be much more painful than other neuralgias.
4. It does not yield to the ordinary treatment (quinine, morphine, bromides, etc). It is aggravated or lessened with the increase or decrease of the intensity of the glycemia.

He ranks these neuralgias with those dyscrasic forms observed in gouty, chlorotic, and saturnine subjects. He leaves as undecided and requiring new investigations, the question whether alterations of the nerves or neurilemma, due to the glycemia, exist.

THE OCCURRENCE OF HYSTERIA IN CHILDREN (*Jahrbch. f. Kindhilkde.*, xv, B., 1 H).—Dr. Hermann Schmidt (Bremen) opens this number of the *Jahrbuch* with such an interesting and thorough article on this subject that it deserves a rather longer abstract than usual.

The old authors who considered hysteria a disease essentially connected with the generative functions of the uterus, could not conceive of its existence in children or in men. Galen and Aretæus mentioned certain hysterical symptoms as occurring in men, but they still held to the opinion of Hippocrates that true hysteria came only from the uterus. Charles Lepois (1618) took his stand upon a new opinion. He says that neither the uterus, the stomach, nor any internal organ is to be blamed for hysteria; it is the head only which is its generator, and this, too, not sympathetically, but idiopathically. The important sentence for us is: "*Enim vero experientiæ fide multæ puellulæ vivunt hystericis tentatæ symptomatibus aut duodecimum, decimum quintum nedum*

decimum octavum ætatis annum." A half century later (1667) appeared Willis' important work: "*Pathologiæ cerebri et nervosi generis.*" He considered hysteria a convulsive disease caused by a mixture of heterogeneous elements with the "spirit of life." For us it is important that he, too, like Lepois, declared that hysteria might occur before puberty. His work was answered and opposed by Hygmore (London, 1670), who looked for the convulsions in a change in the blood. From then on for some years the great question was: "Are hysteria and hypochondriasis identical? Is hysteria a neurosis and dependent on the central nervous system?" At the commencement of this century the discussion gained new interest in France on account of prizes offered by the Academy of Medicine. Georget (1824), Landouzy (1846) and others reported cases of hysteria in children. In 1859 appeared Briquet's great work. He considered hysteria a nervous disease of the brain, and just as apt to occur in children as in adults. Scanzoni, in the same year, admitted the existence of hysteria in children, but considered it due to masturbation. Althaus, Amann, Bouchut, all admit the existence of hysteria in children, though the latter weakens his position by giving to the same group of symptoms, in adults one name, in children another. Skey (London, 1867) reports hysteric men, says nothing of children. Passing over others, we notice Dr. Jacobi's work (*Amer. Jour. Obstet.*, 1876). The first part of this, on masturbation, Dr. Schmidt considers excellent, but the second part, hysteria, he thinks is confusing, because J. includes under the head hysteria almost any nervous or neuralgic symptom. He does not find one genuine case of hysteria in the whole article. Many others are then mentioned. While gynecologues and neuropathologues seem now to be agreed as to the existence of hysteria in children, it is remarkable that works on pediatrics seem to have little or nothing to say on the subject. The author gives a long list of all the works, monographs, and articles on the subject which he has been able to collect, with the number and kind of cases reported in each, and the history in full in nine of the most interesting cases. Assuming the point proved that hysteria may occur in early childhood, it remains only to consider its characteristics when so occurring.

Etiology.—Practically, the causes are predisposing and exciting. Hysteria, considered as a general psychoneurosis, must have some general ground. As the predisposition is greater or less, it will

occur earlier or later—or the greater the predisposition the smaller need the exciting cause be. The principal predisposing causes are what we call a “nervous constitution,”—nervous temperament, whilst the most important excitant is disturbance of the sexual organs. The predisposition is decidedly hereditary. It comes not only from parents, but from grandparents; not only from hysteria in the ancestors, but from epilepsy, neuralgias, various nervous diseases, drunkenness, etc. The predisposition also depends on the bodily and mental “bringing up,” and education. School customs and the habits of large “pensions” (boarding-schools) have much to do with it. Neglect of bodily care, causing anæmia and chlorosis, may also be mentioned. Although disturbances of the sexual organs belong to the exciting causes, they may also be counted among the predisposing, and Jacobi, Scanzoni, Linder, and others, have given interesting details of the extent to which mischief of this sort may be carried by even small children. Passing to the exciting causes, we notice first, pathological changes in the sexual organs. Anomalies of menstruation, of course, must be omitted. Pain of the ovaries has been mentioned, but it was hard to say whether it was cause or symptom. Malpositions of the uterus seem to have no effect till menstruation begins. Most general diseases seem to have little or no causal action. More important, by far, as excitants are psychical disturbances, bad treatment by parents or friends, fright or fear. The overstraining of the mind at school is noted frequently, and finally, as a very frequent cause, the seeing of others in hysterical attacks.

Diagnosis.—This is not easy. The patients cannot and will not help us. An exact family and personal history must be obtained, the early life of the child inquired about, whether it had convulsions during dentition, its mode of life, etc. The commencement of treatment, or even the behavior of the child under explorative examination (laryngoscopy, etc.) often furnishes diagnostic signs. The imposing presence of the doctor is often sufficient, while many have had their questions answered by the use of hot iron, etc. It is hard to differentiate hysteria from simulation. The questions here are: Is the child predisposed to hysteria? Has it any good reason for simulation? Are the symptoms presented such as could be simulated?

Prognosis.—We may say, *a priori*, that the symptoms will increase at the time of puberty. The general prognosis is not good. The severest forms seen in adults are those which began in childhood, and even in cases apparently cured relapses are apt to occur.

Treatment is not different from that used for adults. The symptoms sometimes disappear under purely psychical measures, but usually there is need of tonics, with good diet, fresh air, and before all, when possible, the removal of the exciting as well as the predisposing cause.

Summing up, the author says :

1. Completely developed hysteria occurs both in boys and girls many years before puberty.
2. It is, however, rare at that age.
3. The ground for it is either anæmia or chlorosis, or, on the other hand, a hereditary "nervousness."
4. In light cases, psychical treatment is sufficient ; but the general constitution must always be built up. (*Am. Four. Obstet.*, October, 1880.)

CASES OF ALCOHOLIC INSANITY IN PRIVATE PRACTICE.—At the last meeting of the British Medical Association Dr. H. Sutherland (London) read a paper on this subject : Two hundred cases had been carefully considered ; one hundred male and one hundred female, private patients. Out of one hundred male cases, twenty-six, and out of one hundred female cases, six, were alleged to have been caused by intemperance.

These percentages, twenty-six for males and six for females, correspond pretty accurately with the percentages given in the Report of the Commissioners in Lunacy for 1879, where the percentages were 21.3 for males and 7.9 for females. But, on closer investigation, Dr. Sutherland found that eight of his twenty-six male cases and two of the six female cases, were cases in which alcoholic excess was only a premonitory symptom ; in other words, he believed that one-third of the cases for both sexes, usually said to be caused by intemperance, were in reality cases in which alcoholic excess was only a premonitory symptom. The distinctions between cases of insanity caused by intemperance and cases in which alcoholic excess was only a premonitory symptom were stated to be as follows : When intemperance was a cause, the previous habits of the patient were those of a drunkard ; when it was a symptom, the previous habits had been, comparatively speaking, those of sobriety. When intemperance was a cause, frequently no other influence could be detected which had produced the insanity, or the proofs of intemperance were so marked as to obscure all other etiological points in the previous

history. When intemperance was a symptom only, some other distinct influence was found to have existed, which was more likely to produce mental symptoms than alcohol itself—for instance, a blow on the head. When alcohol was a cause, habits of intemperance had preceded the appearance of the mental symptoms, which had only been developed gradually.

When the intemperance was a symptom, the mental aberration had preceded the abuse of alcoholic stimulants, and the mental symptoms were developed more suddenly. When alcohol was a cause, the mental symptoms were most frequently those of homicidal mania or suicidal melancholia, with acts of eccentricity. When intemperance was a symptom, the mental phenomena were those of melancholia of a subdued form or of delirium tremens. The writer had observed a transient attack of epilepsy on the admission of two cases where intemperance was only a symptom of insanity. This he had only seen in cases caused by intemperance, in the last stages of the disorder, and the epilepsy was then permanent and incurable. When intemperance was a cause, the delusions were of a disagreeable character, and were either those of suspicion or of grandeur. When intemperance was a symptom, the delusions were either of a quiet order, referring to persons other than the patient, or they partook of the peculiar nature of those accompanying delirium tremens. Acute cases of alcoholic insanity recovered ; but, if the intemperance had been a cause, the patient invariably took to drinking again as soon as he was at liberty, and died an early death, frequently from cirrhosis of the liver. On the other hand, when the intemperance was merely a symptom, the patient frequently remained sober after his discharge from the asylum, and was able to return to his duties of social life. Chronic cases of alcoholic insanity did not recover ; but, if the intemperance had been a cause, there was constant craving for drink, whether the patient remained in an asylum or was discharged. Such patients drifted rapidly into the abyss of chronic dementia. If, on the contrary, the intemperance had been merely a symptom, the patient was always contented with a moderate supply of stimulants ; his delusions and his mental condition remained stationary, but he did not become afflicted by dementia, even when advanced age came upon him.

Cases were read illustrating these points of distinction.

HEADACHE IN SCHOOL CHILDREN.—A recent writer, Dr. Treichler, states that about one-third of the pupils in school

suffer more or less from headache. It leads to poorness of blood, and loss of cheerfulness and mental energy. Its chief cause is, probably, overwork, and especially nocturnal study. The anatomical changes which accompany the more advanced stages of this habitual headache are, in the author's opinion : 1. Trophic changes in the ganglion cells of the brain cortex, caused by anæmia. An anæmic brain is much more easily exhausted by mental exertion than a normal one. 2. Passive dilatation of the cerebral blood-vessels and consequent stasis ; the perivascular spaces round the capillaries become narrowed ; the removal of waste products is thus hindered, and in this way, again, trophic disturbance is caused. Recent views, which regard progressive paralysis as commencing by vaso-motor trophic changes in the brain cortex, paretic dilatation of the vessels of the pia mater, and degeneration of the cortex through lymph-stasis, increase the significance and importance of the conditions believed by the author to be brought about by prolonged habitual headache in young people.

The following are some of the recently published articles on the pathology of the nervous system and mind :

GIBNEY, Cervical Pachymeningitis ; the Detailed Histories of Three Cases Occurring in Children, *N. Y. Med. Record*, Sept. 25.—WRIGHT, Cerebral Trance, *Cin. Lancet and Clinic*, Sept. 11.—COLLINS, Asthma as a Reflex Phenomenon, *Rocky Mt. Med. Review*, Sept.—HUTCHINSON, A Report of Three Typical Cases of Neurasthenia, *N. Y. Med. Record*, Oct. 9.—CROTHERS, Clinical Studies of Inebriety ; Permanence of Curability, *Med. and Surg. Rep.*, Oct. 2.—MASON, Lead-Poisoning in Frogs, *N. Y. Med. Jour.*, Oct.—FERNANDEZ, Paralysis of the Fourth and Sixth Pairs of Nerves from Cerebral Traumatism, *Riv. Med. Quirurg de Habana*, Sept.—GOMBAULT, Contribution to the Anatomical Study of Subacute and Chronic Parenchymatous Neuritis, *Arch. de Neurologie*, July, 1880.—MAGNAN, On the Coexistence of Deliriums of Different Nature, *Ibid.* BOURNEVILLE, Contribution to the Study of Idiocy, *Ibid.*—BUCKNELL, Puerperal Convulsions, *St. Louis Med. and Surg. Jour.*, Oct. 20.—BEARD, Inebriety and Allied Nervous Diseases in America, *Gaillard's Med. Jour.*, Oct.—LEPINE, On a Case of Paralysis of Motion and Sensibility in the Four Fingers, with Absolute Integrity of the Thumb. Contribution to Cerebral

Localizations, *Revue Mensuelle*, Oct. 10.—ARANGO, Considerations on Spiritualism, *Cronica Med. Quirurg de la Habana*, October.—WIGHT, How shall we Interpret the Deviation of the Head of the Incurable Epileptic? *Med. and Surg. Reporter*, Nov. 20.—LANDER-BRUNTON, Indigestion as a Cause of Nervous Depression, *Practitioner*, Nov.—BOSWORTH, Bilateral Paralysis of the Abductor Muscles of the Larynx, *N. Y. Med. Jour.*, Nov., 1880.—EVERTS, Diagnosis of Insanity, *Am. Pract.*, Nov.—PETRONE, Contribution on the Subacute Arthropathia Connected with Brain Lesions, *La Sperimentale*, Nov.—WOOD, Contribution to our Knowledge of Nervous Syphilis, *Am. Jour. Med. Sci.*, Oct.—GRAY, Diagnostic Significance of a Dilated and Mobile Pupil in Epilepsy, *Ibid.*—CORNWELL, A Case of Basedow's Disease Terminating in Total Loss of Sight from Inflammation of the Cornea, *Ibid.*—KIERNAN, Insanity, *Gaillard's Med. Jour.*, Nov.—ALVISI, The Speech in Insanity, *Rivista Clinica di Bologna*, Oct.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

INFLUENCE OF BROMIDES ON THE CEREBRAL TEMPERATURE.—Prof. Edward Maragliano reports, *Rivista Clinica di Bologna*, Oct., the results of a series of ten experiments on the effect of bromide of potash on the cerebral (cranial) temperature, from which he draws the following conclusions :

1. Bromide of potassium in single doses of three to five grammes gives rise to an increase of cerebral temperature.
2. This increase averages about one degree Centigrade.
3. It commences to appear a few minutes after the taking of the drug, reaches its maximum at the end of one hour and a half to two hours and a half, and decreases at the end of another two or three hours.
4. Contemporaneously with this rise of cerebral temperature, occurs a very slight increase (two- or three-tenths of a degree) in the axilla.

These observations contradict the previously reported action of bromides, but they seem to have been carefully made and are deserving of attention, if for no other reason than that of the reputation and authority of their reporter.

ÆSTHESIOGENIC VIBRATIONS.—M. Romain Vigouroux recalls, in *Le Progrès Médical*, Sept. 5th, some experiments performed by him, in which the hypothesis of Schiff, that molecular vibrations, transmitted by contiguity, produced a concussion or shock to the nerves, and that the æsthesiogenic effects of various metals applied to the skin were due to such vibrations, differing in rhythm and amplitude according to the substance employed, was suggested and anticipated. His first experiments were made in 1878, in which he employed a tuning-fork *u* 3, introducing the hand of the patient into the sounding-box of the instrument. These experiments were noticed at the time in the *Progrès Médical* of that year, page 747, and the conclusion was deduced "that the vibrations of a tuning-fork have precisely the same physiological action as metals, magnets, and electricity."

Now, reviewing the subject and establishing his own priority in the experimental investigation, M. Vigouroux concludes that this theory of vibrations affords a means of comparison, but not an explanation of the phenomena of metallotherapy. He still holds to this opinion even after reading the memoirs of Schiff and Maggiorani.

NERVE-STRETCHING IN ATAXIA.—Two cases are now on record, one by Langenbuch, the other by Esmarch, in which nerve-stretching was resorted to as a remedy against the intense pains of locomotor ataxia. In both, the success was complete, not merely as far as the pain was concerned, but as a matter of great astonishment, the well-developed disease itself—locomotor ataxia—was cured.

Encouraged by these unexpected observations, Dr. Erlenmeyer attempted nerve-stretching in a case of tabes of two years' standing. (*Centralblatt f. Nervenheilk'de*, Nov., 1880.) The patient, a man of 39 years of age, had the disease in a well-developed form, especially the atactic symptoms, though but little pain at the time. He had previously had a hard chancre, but no secondary symptoms. Specific treatment had been employed without result. At two successive operations the sciatic nerves were exposed and violently stretched, and the wounds dressed antiseptically. Nevertheless, the wound of the left thigh was infected by the fæces; erysipelas set in, and it required over four weeks before the wound was healed. The success of the operation was almost wholly negative. The only improvement gained was an increase in the strength of the legs. But none of the atactic symptoms were

lessened. Dr. Erlenmeyer believes that the failure is probably due to insufficient stretching of the nerves.

ABSINTHISM.—M. Lancereaux, in a recent communication to the Paris Academy of Medicine, Sept. 7th (reported in *La France Médicale*), in which he states the conclusion derived from his investigations that in the syndrome of acute absinthism we do not have the genuine epileptic attack, but rather the convulsive phenomena of hysteria, and that this resemblance between hysteria and absinthism exists not only for the acute form of the latter, but also for its chronic form.

M. Dujardin-Beaumetz referred to his own experiments on pigs (see last number of this JOURNAL), to some of which he had also administered absinthe. In these latter he had developed symptoms of excitement, but nothing like epilepsy.

DUBOISIA IN EXOPHTHALMIC GOITRE.—M. Dujardin-Beaumetz has substituted duboisia in hypodermic injection for atropia, in the treatment of exophthalmic goitre. In the two cases in which he has employed it he obtained a great decrease in the palpitations and the vascular pulse. He noticed, moreover, a ready cumulative action of the drug, although he used quite small doses, from a quarter to a half a milligram, or more. A few days sufficed to develop indubitable signs of intoxication analogous to that produced by belladonna. The solution employed was as follows: neutral sulphate of duboisia, .01; distilled cherry laurel water, 20. Each charge of the syringe, containing one cubic centimetre, contained half a milligram of the duboisia salt.

DIRECT CAUTERIZATION OF A NERVE FOR NEURALGIA.—Dr. Augustus Brown reports to the *British Med. Journal*, Nov. 6th, a case of very severe neuralgia of many years' standing, relieved at once by a rather novel operation. The pain was paroxysmal and was located in the mental nerve on the right side just at the point of its exit from the foramen; from there it extended backward to the front of the ear; then upward to the vertex, forward to the frontal nerve, down the right side of the face and neck to the arm, and backward to the scapula. The gum above the painful point was congested and harder than on the opposite side; the tongue was white and tremulous. All the teeth were gone (the patient

was a lady, aged 56), and a portion of the alveolus had been extracted on the idea that the pain was due to pressure from a buried dental snag, but this proved not to be the case.

Dr. Brown made an incision along the lower border of the jaw and dissected upward till he reached the mental foramen. Then he ran a red-hot steel wire a quarter of an inch or more into the foramen and completely destroyed the nerve for that distance. Considerable hemorrhage followed the operation, but the wound healed kindly and the patient was completely restored to health and perfect freedom from pain. The doctor never witnessed a more satisfactory result from an operation, and he thinks that in the actual cautery of nerves is a remedial measure on which, in many cases, we can depend when others fail, and one that, in many instances, may supersede nerve-stretching, as well as possibly be of great benefit in tetanus.

TREATMENT OF ASTHMA.—Dr. R. B. Faulkner of Alleghany, Pa., claims, *N. Y. Med. Record*, Sept. 25, to have succeeded, in cases of spasmodic asthma that were resistant to other treatment, by the use of local counterirritation over the course of the pneumogastrics in the neck, with tincture of iodine, even to producing a blister. He also gives iodide of potash internally. This treatment not only appears to afford quick relief from the paroxysms, but to prevent their return. All the cases on which he has tried this treatment since the idea occurred to him, three in number, have had the same relief.

URECHITES SUBRECTA.—Dr. Isaac Ott, *Therapeutic Gazette*, Oct. 15th, publishes his investigation on the physiological action of Urechites subrecta, a Jamaica plant passing under the local name of nightshade, which had been already chemically described by J. J. Bowrey, Government chemist of Jamaica. The latter found it to contain three active substances in its poisonous leaves, which he named urechitoxin, amorphous urechitoxin and urechitin, all glucosides. The last-named one includes all the poisonous principle, the urechitoxin being a chemically-changed urechitin.

Dr. Ott's experiments were performed on cats, frogs and rabbits. Its general effects had been already described by Bowrey, including vomiting, incoördination, weakness, sweating, convulsive movements, salivation, etc., and therefore most of his own experiments were mostly directed to find its action on the various

vital organs respectively. Dr. Ott found that it does not specially affect the motor nerves, nor completely destroy sensibility, though that is much impaired. This impairment is due to its effects on the spinal cord; the convulsions are probably cerebral, as they were not observed after section of the medulla in frogs. As regards its action on the circulation he found that it decreased the frequency of the cardiac pulse, and increased and then decreased the arterial tension. This depression of the pulse is not due to irritation of cerebral inhibitory centres, as it appeared after the vagi had been divided. Nor is it due to the peripheral inhibitory apparatus, as this was paralyzed with atropia without changing the effect. As the drug reduces the irritability of striped muscular fibre it is probable that its action was exerted on the cardiac muscle itself. It was found not to paralyze the vagus.

The increase of blood pressure is produced by an action on the peripheral vaso-motor system and not by one on the prime vaso-motor centre. As it produces a cramped condition of the intestinal tube, it is possible that this may have to do with the increase of arterial tension. Further experiments, however, are needed to decide the question. The following parallel of the actions of urechitin and aconite is offered, the statements in regard to the action of the latter drug being mainly on the authority of Dr. J. M. Murray.

<i>Urechitin.</i>	<i>Aconite.</i>
Contains no nitrogen.	Contains nitrogen.
Powerful toxicant.	Powerful toxicant.
Kills mainly through cardiac arrest.	Kills mainly through respiratory apparatus.
Does not paralyze motor nerves.	Does not paralyze motor nerves.
Does not paralyze sensory nerves, but does the spinal sensory ganglia.	First paralyzes sensory nerves, and then nerve trunks, and finally the spinal sensory ganglia.
Reduces pulse by an action on the heart, probably on its muscular structure.	Reduces pulse by an action on the intracardiac ganglia.
Increases arterial tension, and then reduces it; the rise is due either to peripheral vaso-motor system, or to cramp of the intestinal canal.	Increases and then decreases arterial tension by an action on the cardiac ganglia.
Does not paralyze the pneumogastrics.	Small doses paralyze the pneumogastrics.
Causes no delirium cordis.	Causes delirium cordis.
Is a salivator.	Is a salivator.
Increases the secretion of the skin.	Increases the secretion of the skin.

It will be seen from the above that while its action is somewhat different from that of aconite, the results are very similar. Dr. Ott advises, therefore, its trial in diseases where aconite is found useful. On account of its dangerous special properties, he advises the use of digitalis in case of poisoning. The paper concludes with an account of an experiment on a man weighing 215 pounds, who took five drops of the fluid extract followed at intervals of forty and thirty minutes respectively by additional doses of five and twenty drops. This produced, as in the lower animals, decreased pulse, salivation, perspiration, vomiting and diarrhœa.

ACONITIA.—The following are the conclusions of a paper by Dr. Sidney Ringer on the antagonisms of aconitia on the frog's heart, in the *Journal of Physiology*, ii, 5 and 6 :

1. Aconitia slows and weakens the heart and incoördinates the ventricular contraction, this incoördination occurring before the heart's contractions are greatly weakened.

2. Sometimes the contractions, though greatly slowed and very incoördinate, continue fairly strong till the heart stops.

3. Aconitia acts on the ventricle far more powerfully than the auricles.

4. Aconitia has a more powerful action on the cerebro-spinal centres than on the nervous structure of the heart, for after complete paralysis the heart often continues to contract well for a considerable time.

5. The general depression from a poisonous dose of aconitia is partly and perhaps chiefly due to the direct action of the drug on the nervous centres, rather than to the weakening of the circulation consequent on the failure of the heart.

6. Atropia antagonizes the action of aconitia on the heart. It restores the contractions in a heart arrested by aconitia, and strengthens, accelerates, and coördinates the heart simply weakened, slowed, and incoördinated by aconitia.

7. Aconitia does not antagonize the action of muscarin, nor can muscarin antagonize the action of aconitia on the heart.

8. Atropia antagonizes the combined effects of aconitia and muscarin.

9. Pilocarpine does not antagonize the action of aconitia on the heart.

10. Atropia antagonizes the combined effects of aconitia and pilocarpine.

11. I have suggested that the antagonisms are due to chemical displacement. Atropia antagonizes muscarin, pilocarpine and aconitia because it has a stronger affinity for the muscular and nervous structures of the heart than these substances, and displaces them, replacing their effect by its own.

THE THERAPEUTIC USE OF MAGNETS.—Dr. W. A. Hammond reports, in the November number of the *New York Medical Journal*, his experience with the therapeutic use of magnets. He describes two cases of hemiplegia and two of chorea in which the application of strong horseshoe magnets produced, apparently, astonishing results. In the two choreic cases a few minutes' application cured the disease, and there was no relapse. In one of the hemiplegics there was a recovery of both sensation and motion of the paralyzed side on the day of the application, and speech (the patient was aphasic) returned before the next morning. Some twenty days later, however, a second attack proved fatal. In the other case there followed the use of the magnet a complete and lasting return of sensibility, but no improvement in other respects. In seven other cases of chorea the magnets had no effect.

Dr. Hammond, commenting on these cases of hemiplegia, as well as those reported by Debove and Boudet, suggests that whatever organic lesion existed was mainly, at least, situated in the thalamus. It would be asking too much, he thinks, to claim any specific influence of the magnets, and the frequent transitory character of the symptoms in thalamic lesions affords one of the best means of explanation. It may be that a strong mental influence was the cause of the relief. He offers the cases simply as facts of interest, pointing out a line worthy of further research.

The following are the titles of a few of the recently-published articles on the therapeutics of the nervous system and mind :

ROCKWELL, On the Value of the Galvanic Current in Exophthalmic Goitre, *N. Y. Med. Rec.*, Sept. 11.—NEWLAND, On the Rational Treatment of Epilepsy, *St. Louis Med. and Surg. Jour.*, Oct. 5.—SEGUR, Prophylaxis of Puerperal Convulsions, *Prac. Med. Soc. Co. Kings*, Oct., 1880.—GARRETTSON, Excision of the Inferior Dental Nerve by means of the Dental Engine, for the Relief of Obstinate Neuralgia, *N. Y. Med.*

Record, Oct. 23.—MANN, Dipsomania and the Opium Habit, and their Treatment, *Southern Clinic*, Oct.—RUTTER, Lunatic Asylums, *Cincinnati Lancet and Clinic*, Oct. 30.—LANDESBURG, Case of Neuralgia of the First Branch of the Fifth Pair, of Six Years' Duration, Cured by Duquesnel's Aconitia, *Med. and Surg. Reporter*, Nov. 6.—ALLEN, Asylum Supervision, *Jour. of Psych. Med.*, vol. vi, part 2.—GRAFF, Headache and the Remedies Proposed, *Physician and Surgeon*, Dec.

BOOKS, ETC., RECEIVED.

Real-Encyclopädie der Gesammten Heilkunde. Medicinisch-chirurgisches Handwörterbuch für praktische Ärzte. Herausgegeben von Dr. Albert Eulenburg. Mit zahlreichen Illustrationen in Holzschnitt. IV Band (Heft 31-40). Wien und Leipzig, 1880.

Handbuch der Allgemeinen Therapie. Herausgegeben von Dr. H. v. Ziemssen. Zweiter Band, Erster Theil: Klimatotherapie von Dr. H. Weber. Balneotherapie, von Prof. O. Leichtenstern. Leipzig, 1880.

Compendium der Psychiatrie für praktische Ärzte und Studierende. Von Dr. J. Weiss. Wien, 1880.

Handbuch der Speciellen Pathologie und Therapie. Herausgegeben von Dr. H. v. Ziemssen. Achter Band: Krankheiten des Chylopoëtische Apparates. II. Erste Hälfte, Zweite Abtheilung: Gall und Pfortader. Von Prof. O. Schüppel. Leipzig, 1880.

Dictionnaire Encyclopédique des Sciences Médicales. Directeur A. Dechambre. Deuxième Serie, L-P. Tome Quatorzième. Oci-Olc. Troisième Serie, Q-Z. Tome Huitième, Sen-Sep. Tome Neuvième, Sep-Ser. Paris, 1880.

Sulla Genesi della Allucinazioni. Pel Prof. Augusta Tamburini. Reggio nell 'Emilia, 1880.

Die Provinzial Irren-, Blinden-, und Taubstummen-Austalten der Rheinprovinz, in ihrer Entstehung, Entwicklung und Verfassung, dargestellt auf Grund eines Beischlusses des 26. Rheinischen Provinzial-Landtages, von 3. Mai, 1879. Mit 48 in den Text gedruckten Holzschnitten. Düsseldorf, 1880.

Contributo allo Studio delle Malattie Accidentali dei Pazzi. Dei Dottori Seppilli, Guiseppe e Riva, Gaetano. Della Clinico Psichiatrica della R Università di Modena. Diretta del Prof. Tamburini. Milano, 1879.

Minor Surgical Gynecology; a Manual of Uterine Diagnosis and the lesser Technicalities of Gynecological Practice, by Paul F. Mundé, M. D., with three hundred illustrations. New York: William Wood and Company, 1880. Wood's Library of Standard Medical Authors, No. 12.

Ein Fall von Tumor in der vorderen Centralwindung des Grosshirns. Mitgetheilt von Dr. W. Erb, Professor in Leipzig. (Separatabdruck. *Deutsches Archiv für Klinische Medicin*, 1880.)

The Practicability and Value of Non-Restraint in Treating the Insane, by J. C. Shaw, M.D. Read before the Conference of Charities at Cleveland, Ohio, July 1, 1880.

Electricity in Medicine and Surgery, with cases to illustrate, by John J. Caldwell, M.D., Baltimore, Md.

Report of ten cases of Gastric Ulcer; one case, Malignant Ulcer of the Stomach, and two cases, Perforating Ulcer of the Jejunum; with extracts from a lecture by Dr. Murchison, of London, on the subject. By A. Van Derveer, M.D. Reprinted from the *Medical Annals*, August, 1880.

The Treatment of the Genito-Urinary Organs; the Use of Electricity, Danicana, etc., etc. By J. J. Caldwell, M.D., Baltimore, Md. Reprint from the *St. Louis Medical and Surgical Journal*, June, 1878.

Diet for the Sick. By J. W. Holland, M.D. Morton's Pocket Series, No. 1.

Report of the Board of Health of the State of Louisiana for the year 1880. New Orleans: J. S. Rivers, 1880.

Acts of the Legislature of Louisiana Establishing and Regulating Quarantine, also Rules and Regulations of the Board of Health and Health Ordinances of the city of New Orleans. By Joseph Jones, M. D. New Orleans: J. S. Rivers, 1880.

Report of the Pennsylvania Hospital for the Insane for the year 1879. By T. S. Kirkbride, M.D., Physician-in-Chief and Superintendent. Philadelphia, 1880.

Report of the Board of Trustees of the Eastern Michigan Asylum at Pontiac, for the biennial period ending Sept. 30, 1880.

Second Biennial Report of the Trustees, Superintendent, Treasurer, and Architect, of the Illinois Eastern Hospital for the Insane, at Kankakee, October 1, 1880.

THE FOLLOWING FOREIGN PERIODICALS HAVE BEEN
RECEIVED SINCE OUR LAST ISSUE.

Allgemeine Zeitschrift fuer Psychiatrie und Psychisch. Gerichtl.
Medicin.
Annales Médico-Psychologiques.
Archives de Neurologie.
Archives de Physiologie Normale et Pathologique.
Archiv fuer Anatomie und Physiologie.
Archiv fuer die Gesammte Physiologie der Menschen und Thiere.
Archiv fuer Path. Anatomie, Physiologie, und fuer Klin. Medicin.
Archiv f. Psychiatrie u. Nervenkrankheiten.
Archivio Italiano per le Malatie Nervose.
Brain.
British Medical Journal.
Bulletin Générale de Thérapeutique.
Centralblatt f. d. Med. Wissenschaften.
Centralblatt f. d. Nervenheilk., Psychiatrie, etc.
Cronica Med. Quirurg. de la Habana.
Deutsche Medicinische Wochenschrift.
Deutsches Archiv f. Geschichte der Medicin.
Dublin Journal of Medical Science.
Edinburgh Medical Journal.
Gazetta degli Ospitali.
Gazetta del Frenocomio di Reggio.
Gazetta Medica di Roma.
Gazette des Hôpitaux.
Gazette Médicale de Strasbourg.
Hospitals-Tidende.
Hygeia.
Jahrbücher für Psychiatrie.
Journal de Médecine de Bordeaux.
Journal de Médecine et de Chirurgie Pratiques.
Journal of Mental Science.
Journal of Physiology.
La France Médicale.
Le Progrès Médical.
Lo Sperimentale.
L'Union Médicale.
Mind.
Nordiskt Medicinskt Arkiv.
Norsk Magazin for Lagensvidenskabens.
Practitioner.
Revue Mensuelle de Médecine et de Chirurgie.
Rivista Clinica di Bologna.
Rivista Sperimentale di Freniatria e di Medicina Legale.
Schmidt's Jahrbücher der In- und Ausländischen Gesammten
Medicin.

St. Petersburg Med. Wochenschrift.
Upsala Lakareformings Forehandlinger.

THE FOLLOWING DOMESTIC EXCHANGES HAVE BEEN
RECEIVED :

Alienist and Neurologist.
 American Journal of Insanity.
 American Journal of Medical Sciences.
 American Journal of Obstetrics.
 American Journal of Pharmacy.
 American Medical Journal.
 American Practitioner.
 Annals of the Anatomical and Surgical Society.
 Archives of Comp. Med. and Surgery.
 Archives of Dermatology.
 Archives of Medicine.
 Atlanta Medical and Surgical Journal.
 Boston Medical and Surgical Journal.
 Buffalo Medical Journal.
 Bulletin National Board of Health.
 Canada Medical and Surgical Journal.
 Canada Medical Record.
 Canadian Journal of Medical Sciences.
 Chicago Medical Journal and Examiner.
 Chicago Medical Review.
 Chicago Medical Times.
 Cincinnati Lancet and Clinic.
 Clinical News.
 College and Clinical Record.
 Country Practitioner.
 Detroit Lancet.
 Dial.
 Gaillard's Medical Journal.
 Independent Practitioner.
 Index Medicus.
 Indiana Medical Reporter.
 Maryland Medical Journal.
 Medical and Surgical Reporter.
 Medical Annals.
 Medical Brief.
 Medical Herald.
 Medical News and Abstract.
 Medical Record.
 Michigan Medical News.
 Monthly Review.
 Nashville Journal of Medicine.
 Neurological Contributions.

New Orleans Medical and Surgical Journal.
New Remedies.
New York Medical Journal.
Pacific Medical and Surgical Journal.
Philadelphia Medical Times.
Physician and Bulletin of the Medico-Legal Society.
Physician and Surgeon.
Proceedings of the Medical Society of the County of Kings.
Quarterly Epitome of Braithwaite's Retrospect.
Quarterly Journal of Inebriety.
Rocky Mountain Medical Review.
Sanitarian.
Science.
Southern Clinic.
Southern Practitioner.
Specialist and Intelligencer.
St. Joseph Medical and Surgical Reporter.
St. Louis Clinical Record.
St. Louis Courier of Medicine.
St. Louis Medical and Surgical Journal.
Therapeutic Gazette.
Toledo Medical and Surgical Journal.
Veterinary Gazette.
Virginia Medical Monthly.
Walsh's Retrospect.

THE
Journal
OF
Nervous and Mental Disease

Original Articles.

A CASE OF RAPID AND WIDESPREAD MUSCULAR WASTING WITHOUT DISEASE OF THE SPINAL CORD.

BY J. J. PUTNAM, M. D.,

BOSTON.

THE patient whose history is the subject of this paper entered the Massachusetts General Hospital in May, 1879, under the care of Dr. S. L. Abbot, who very kindly allowed me to see and investigate the case, and subsequently to examine the spinal cord, and now permits me to make full use of his clinical notes. My thanks are due both to him and to his then clinical assistant, Dr. W. P. Gannett.

The essential features of the patient's last illness were as follows: It was an acute febrile attack, ending fatally in about one month, and characterized by severe pain, diminution of sensibility, rapid muscular wasting, and diminution of electrical irritability in all four extremities, mainly confined to the parts below the elbows and the knees, also by alteration of the mental condition, and delirium.

After death, spots of softening were found in the great ganglia of the brain and in the centrum semiovale. The

spinal cord was essentially healthy. The peripheral nerves were not examined, but the inference is drawn that the case was one of disseminated neuritis.

The following are the details of the case :

Margaret C., married, 50 years old, was admitted to the Massachusetts General Hospital May 22, 1879, and gave the following history :

She had always been well, as she thought, until three weeks before entrance. At that time she became chilly and feverish, and supposed herself to have taken cold. She was attacked at the same time with severe pain, which began in the toes of both feet, but extended over the entire body. The use of the legs became progressively impaired, and the hands also grew so weak that in the course of two weeks she became unable to hold anything in her grasp. She had been obliged to keep her bed from the first of the attack, and her sleep had been much disturbed by pain. No nourishment could be retained except milk.

On examination there was found to be no swelling of the joints ; a good deal of general tenderness on pressure, not sharply localized ; motion at the wrist and ankle and phalangeal joints was found to be greatly impaired, and the cutaneous sensibility of the skin over the feet and ankle joints diminished. Auscultation of the heart revealed nothing abnormal. No reflex movement could be excited by tickling the soles of the feet. The temperature was 100.1° (F.) ; pulse, 110 ; respiration, 30. Milk was ordered in small quantities, and salicyl. soda, grs. x, every hour, p. r. n.

The subsequent history of the case is as follows :

May 23d.—Much pain during night. Was given Dover's powder, grs. x. The catamenia appeared during the night.

May 24th.—Was somewhat delirious and quite restless through the night, and is still slightly so. Complains of pain and burning in the feet, but they are not swollen or tender.

May 25th.—Delirious during night ; nearly free from pain and delirium this morning. Tongue dry in centre, furred on both sides.

May 26th to 31st.—No marked change.

The report of the examination of the urine (Prof. E. S. Wood) is as follows :

Urine.—Acid ; yellow ; sp. grav. 1017 ; urophain slightly diminished ; indican and urea normal ; uric acid in excess.

Earthy phosphates normal. Alkaline phosphates slightly increased. A slight trace of albumen. Considerable sediment containing numerous hyaline and granular casts, considerable uric acid, excess of mucus, a little blood, clumps of pus, much bladder and vaginal epithelium. Some of the casts have highly refracting granules on them.

May 31st to June 2d.—Complains of no pain except in feet. No tenderness or other abnormal sign about vertebral column. A subcutaneous injection of pilocarpine (gr. $\frac{1}{3}$) yesterday caused a profuse sweat.

Her present condition is as follows:

All movements of the arms at the shoulder and elbow, and of the legs at the thigh and knee, are possible, though but slowly and feebly performed. There is no voluntary or reflex movement of the fingers and hands, nor of the feet and toes. The movements of the head are apparently free.

There is well-marked loss of sensibility of the skin of all four extremities, especially of the arms below the elbows, and of the legs below the knees, the intensity of the anæsthesia increasing the nearer the feet are approached.

Within these areas neither contact of the finger nor moderately strong applications of electricity excite any sensation. Applied to other parts of the arms or legs, such currents cause manifestations of pain.

The arms are usually, though not invariably, somewhat flexed, and the biceps rigid.

Under these circumstances the biceps can be excited to contraction by sudden, passive stretching.

The results of the electrical examination at this date were as follows:

Left arm; faradic current; the reaction of the ulnar and musculo-spiral nerves, and of the muscles supplied by them, is preserved but greatly diminished. The biceps and triceps react better, though hardly as well as normal.

The reaction of the median nerve, and of all the muscles supplied by it, as well as that of the interosseous muscles, is entirely wanting.

Galvanic current. The typical degenerative reaction is nowhere present. Strong currents, however, elicit feeble contractions

from most or all of the muscles, if applied directly ; not, however, through the medium of their nerves, except in the case of the median. However excited, the contractions are quick and short in character.

The condition of the right arm is essentially the same with that of the left.

Left (and right) leg ; faradic current. The reaction of the quadriceps ext. cruris group and of the hamstring muscles is preserved, though only the feeblest contractions can be excited.

When applied to the peroneal nerve even the strongest currents fail to excite any contraction in the corresponding muscles.

A strong *galvanic* current, on the other hand, applied to the same nerve, excites marked though feeble contractions in all the muscles supplied by it. These contractions appear and disappear more slowly than normal.

Strong *galvanic* currents applied directly also excite contractions in these same muscles. These contractions likewise are slower than normal, and if repeatedly excited their intensity becomes rapidly less (reaction of exhaustibility).

The muscles of the back and of the neck react apparently well.

All the muscles of the body, but especially those which have lost their faradic reaction, are extremely feeble. The interosseous muscles, as well as the long flexors of the fingers, are noticeably atrophied.

All the reflexes (except that of the biceps above alluded to), including also the reflex of the abdominal muscles, and the conjunctival reflex, are wanting. The corners of the mouth are drawn down, giving the face a haggard expression ; but this may be partly due to the fact that the patient is drowsy and but semi-conscious.

The fundus of the right eye, examined with the ophthalmoscope, shows no abnormal appearance.

Passive movements of the arms and legs cause decided expressions of pain.

The patient lies groaning without interruption, though she can be aroused by the sound of her name, etc., when her face often breaks into a senseless smile.

The pupils are equal and about normal in size ; they respond slightly, though promptly enough to light.

June 4th. Condition the same. Patient lies in a stupefied condition, but can be aroused without much difficulty, and says she has no pain.

June 6th. Since the last report the patient has failed very rapidly. Cannot now be aroused. Swallows a little brandy and water with much choking. Passes urine involuntarily, as she has for several days.

The patient sank rapidly during the following night, and died quietly at 4.15 A.M. of the 7th, the temperature having risen through the past two days, reaching 107° an hour before death.

The temp. (axillary) chart of the greater part of the sickness was as follows :

DATE.	TEMP. (F.).		PULSE.		RESP.	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
May 22d . .	—	100.4°	—	110	—	30
" 23d . .	100°	99°	110	100	21	24
" 24th . .	98.7°	98.7°	110	102	20	25
" 25th . .	98.6°	99°	100	108	20	25
" 26th . .	98°	104°	106	104	20	30
" 30th . .	100°	102°	110	140	17	30
" 31st . .	100°	102°	108	120	30	34
June 2d . .	101°	102.4°	110	128	28	32
" 6th . .	Noon. 105.2°	Midnight. 106.4°	Noon. 110	Midnight. 140	Noon. 34	Midnight. 39
" 7th . .	3 A.M. 107°	Death at 4.15 A.M.				

The treatment employed (salicylic acid at first, subsequently brom. pot. and other palliatives, moderate alcoholic stimulation, milk) had the effect of keeping excitement, pain and fever down to a moderate point, and in view of the acute softening in the brain, discovered *post mortem*, it is improbable that death was directly hastened by any of these conditions.

At the autopsy, which was made by Dr. R. H. Fitz, the organs of the chest and abdomen were found to present no abnormal appearance. The kidneys were not further examined, but the condition of the urine, together with the fact that the arteries throughout the spinal cord were subsequently found notably thickened, suggest that, nevertheless, some degree of disease may have been present in them.

Examination of the brain revealed the presence of a number of spots of softening, of yellowish color, varying in size from that of a marble to that of a pea. The largest of these spots lay in the upper portion of the white substance of the left parietal lobe, and the tissue round it was reddened.

In the right optic thalamus and left corpus striatum were similar spots of rather smaller size, and the posterior third of the outer division of the nucleus lenticularis on both sides showed evident microscopic, though but slight macroscopic signs of a somewhat ill-defined process of the same kind, in the presence of numerous granular corpuscles such as the larger spots also contained.

The internal capsule was but little if at all involved, and that in its posterior part.

The spinal cord was not removed until the following morning, and, owing no doubt to that cause, the subsequent processes of hardening (by Müller's fluid) and coloring were not so satisfactory as could have been wished, and there was difficulty in making as thin sections as were desired. Still, with the aid of Rutherford's freezing microtome and the methods of hardening in mucilage, specimens were obtained which permitted of careful microscopic study.

Before hardening, cuts were made into the cord at short intervals, *but no departure from the normal appearances could be discovered.* The membranes seemed everywhere healthy. After the specimen had lain for a day in Müller's fluid, the surface of several of the cuts, both in the cervical and lumbar enlargement, was scraped, and fine specimens of ganglion cells obtained. Of these almost all contained more, sometimes much more, pigment than is usually met with, but they presented no appearance that was distinctly pathological. Neither was any abnormal condition of the nerve fibres to be made out.

On examination of the hardened cord one pathological change was everywhere visible, namely, thickening of the walls of the arteries, and there was also, in the cervical region, a very slight increase in the connective tissue of one of the lateral columns, giving rise to a slightly heightened blush in the carmine-stained sections. This change did not extend through the whole length even of the cervical cord, most of the sections showing no trace of it. As it was thought to be of but little significance no attempt was made to define its limits.

The ganglion cells of the anterior cornua were normal both in number and outline. They contained, as stated, more pigment than usual, failed to take up the carmine readily, and in a few of them small vacuoles were found.

No great importance could be attached to the loss of reaction to the carmine in the absence of other signs of disease, since this may well have been due to the same putrefactive changes that prevented hardening, the more so that the other cellular elements of the cord were in the same condition in this respect.

The formation of the small vacuoles may have been due to disease, but it also may have been due to putrefactive changes, and at any rate the number of the cells affected in this way was too small to account for the widespread muscular atrophy.

Of the condition of the *peripheral nerves* and of the muscles I am, unfortunately, unable to speak. A portion of the peroneal nerve and of one of the diseased muscles was reserved for examination, but was accidentally thrown away. To the naked eye the nerve seemed to have undergone no change whatever, either in size, consistency or color.

The symptom which presents the most interest in this unusual case, and for which we might have expected the most readily to find an explanation through the *post-mor-*

tem examination, is the rapid muscular atrophy, associated, as it was, with great diminution or entire loss of electrical reaction of the affected nerves and muscles. Only so far as the pathological changes that were actually discovered may be taken as a guide, the lesion which brought about this result must have had its seat either in the muscles themselves or in the peripheral nerves, and, as a matter of fact, the clinical picture was closely like those presented by most of the cases quoted and reported by Leyden in his recent admirable paper,* or others given in the thesis of Dr. J. Gros,† and, indeed, in the case given at greatest length by Leyden (p. 40), and in one or two of those quoted from others, just such slight changes in the spinal cord were found (formation of small vacuoles, increase of pigmentation) as in this case, and good reasons are offered for thinking that they were secondary and of little moment.

The diagnosis by exclusion speaks likewise with great positiveness either for disseminated neuritis or for a myositis with secondary involvement of the mixed nerves. The idea could not be entertained that the lesions in the cerebral ganglia might account for the pain and the rapid atrophy; the cord was essentially healthy; there remains only the nerves and the muscles themselves to consider. That all the symptoms, even including the pain, might be due to an acute myositis is not to be denied on *à priori* grounds; but we are, perhaps, bound to exhaust, first, the better accepted hypothesis, which favors the neurotic origin of such cases as this. It remains, at the same time, to be said that since, in all the cases quoted, the muscles as well as their nerves were found diseased, it is somewhat a begging of the question to say that the nerves were certainly primarily at fault.

* Ueber Poliomyelitis und Neuritis. *Zeitschr. für Klin. Med.*, Bd. 1, Hf. 3.

† Contrib. à l'histoire des névrites. Paris, 1879.

At any rate, if the disease begins in the nerves it does so usually at their peripheral extremities. Thus, in this case, as in very many of those which have been reported, the severest symptoms affected not all the muscles or surfaces of skin supplied by one great nerve trunk, but the parts furthest removed from the central organs, irrespective of the source of the nerve supply,—the legs below the knee, the arms below the elbow, and of these the feet and the hands more than the forearms and the legs.

As regards the changes of sensibility, this rule was in our case most striking, and the same is true of some of the cases reported by others. Thus, in one quoted by Gros* we read :

“24 fevr. Depuis quelques jours, le malade se plaint de douleurs très vives, exclusivement localisées aux deux pieds,” * * * etc.

“5 mars. Toujours des mêmes douleurs aux membres inférieurs. Diminution de la sensibilité. Tous ces symptômes restent limités aux pieds et aux régions malléolaires. Depuis deux jours, il accuse des douleurs de la même nature dans la paume de la main du côté gauche.” * * *

In another place (p. 51): “Elle (la sensibilité) est abolie complètement dans les pieds, dans la région externe des jambes, c'est-à-dire dans le domaine du nerf saphène externe *et dans les branches terminales des autres nerfs.*”

It is not, however, always the case that the peripheral distribution of several nerves is simultaneously and exclusively involved, so much so that Gros lays it down as one of the diagnostic marks of the affection that the symptoms, both sensitive and motor, predominate in the distribution of one or more nerves.

I hope soon to bring further evidence in favor of the opinion which I expressed some years ago, that whether we are dealing with diseases of muscles, nerves or (motor)

* *Loc. cit.*, p. 61.

nerve nuclei, the types of disease are apt to be the same, showing a greater vulnerability on the part of certain muscles, their corresponding nerve fibres and their corresponding nerve nuclei, than is shown by their fellows. It is my belief that this may hold good of the sensitive tracts as well, and that this general law will render clear the recurrence of certain types of diseases involving alterations of sensibility and muscular nutrition better than any simply topographical explanation.

The admission of disseminated neuritis into our nosologies opens a wide field for study, the limits of which are well defined in the monographs to which I have referred. The differential diagnosis has to take account, not only of the so-called ascending spinal paralysis of Landry, of poliomyelitis, perhaps progressive muscular atrophy (Leyden) and lead paralysis of rapid onset (of which I have recently seen a striking illustration), but even of meningitis, as is pointed out by Gros (p. 53).

It is possible that the following case will prove to be an illustration of this fact :

A patient died last summer at the Massachusetts General Hospital, under the care of Dr. B. S. Shaw, who kindly allowed me to examine the case and the specimens, who, throughout her sickness, showed marked symptoms of acute meningitis, viz., extreme pain in the neck, the back and the limbs, greatly increased on even the slightest movement, fever and muscular paralysis, which improved after a time with marked wasting, especially in certain groups of muscles. At the autopsy no sign of meningitis was present.

The cord has not yet been examined microscopically, but seemed to contain minute scattered foci of inflammation.

The pain, which was the marked feature of the whole case, could hardly be explained by the trifling disseminated myelitis, if this proves to be present, while the latter could well have been secondary to an acute neuritis.

CONTRIBUTIONS TO THE PHYSIOLOGY OF THE SPINAL CORD AND ADJACENT PARTS.

BY GEO. B. WOOD FIELD, M.D.,
EASTON, PENN.

THE nervous system has lately, through the researches of Fritsch, Hitzig and Ferrier, been the subject of much observation and experiment. The path of the conductors of sensation and motion in the spinal cord has been and is still an object about which much discussion exists. Alexander Walker, in 1809, first started the idea that the posterior columns contained the motor conductors, whilst the anterior columns contained the sensory. It was held by Galen, Flourens, Nasse, Longet,* Kürschner, Volkmann and Chauveau that the conductors of voluntary movement and sensibility did not decussate. Brown-Sequard and Budge believed the conductors of voluntary movement did not decussate, but that the conductors of sensory impressions did in part.

Lately, Brown-Sequard explains this sensory decussation in another way. Van Kempen† held that the transmission of voluntary movement in animals is direct in each half of the spinal cord, and that it is partly crossed in the cervical

* *Nerven System*, Leipzig, 1849.

† *Experiences Physiologiques sur la Transmission de la Sensibilité, et du Mouvement dans Moelle Épinère*, Bruxelles, 1859.

region; that the transmission of sensibility in the spinal cord is partly crossed throughout the whole extent of the cord.

Fodera, Cooper, Kölliker and Eigenbrodt* arrived at the conclusion that the conductors of motion and sensation partly decussate. The opposite views were thought to result from the different animals experimented upon, but Von Bezold† proved this to be an error. Schiff‡ arrived at the conclusion that the antero-lateral columns conduct motion and not sensation, and that the gray matter conducts painful sensations, whilst the posterior columns conduct tactile impressions. Ludwig§ and his pupils, Miescher, Nawrocki and Dittmar, held that in the rabbit all the sensory and efferent vaso-motor fibres are contained in the lateral columns.

Woroschiloff§ was able, by means of a specially devised instrument, to divide the spinal cord in different extents with the least possible injury to the undivided parts. He proved that in the lumbar segment of the cord of the rabbit all the sensory and motor fibres run in the lateral columns. Ott and Smith¶ have, by means of Woroschiloff's instrument, shown that in the cervical segment of the spinal cord the sensory, vaso-motor, motor, cilio-spinal and respiratory nerves run in the lateral columns; that the posterior columns are concerned in coördination, and that the motor and sensory fibres in the cervical segment partly decussate. Ott has shown, by the pupil and bleeding tests, that tactile fibres not only run in the posterior columns, but also in the lateral columns; that inhibitory fibres run in the lateral

* Über die Leitungsgesetze im Rückenmarke, Giessen, 1848.

† Untersuchungen aus dem Physiologischen Laboratorium im Würzburg, und über die gekreuzten Wirkungen des Rückenmarkes, Leipzig, 1869,

‡ Lehrbuch die physiologie des Menschen, Jahr, 1859.

§ Ludwig's Arbeiten.

§ Ludwig's Arbeiten.

¶ *Am. Med. Journal*, October, 1879.

columns and decussate, and that sweat fibres also run in the lateral columns.

Recently, Schiff has returned to the subject of the spinal cord, holding that the Leipzig School and its followers have been misled by traumatisms; that the antero-lateral columns are unable to transmit any sensory impulses, whilst sensations of pain are conveyed by the gray matter. He used dogs, and permitted them to live for a long time, and after death made sections of the cord, which he examined with a polarizing apparatus.

N. Weiss (*Centralblatt*, 1880, No. 29) has arrived at completely opposite conclusions to those put forth by Schiff. He also used dogs, and made sections at the junction of the lumbar and dorsal segment of the spinal cord. In a young dog the cord was cut so that only the left lateral and left anterior columns were intact, the whole of the gray matter, right half of the cord, and left posterior column being divided. It was found that the dog had sensibility in, and could move, both posterior extremities. The conclusion necessarily followed that one lateral column contains sensory and motor fibres for both halves of the body. If the lateral columns are divided on both sides, then the sensibility and motility is lost behind the section in a complete manner, so that there is no reason to regard the gray matter as conducting, for any distance, either motion or sensation. He holds that the anterior columns do not conduct either sensibility or motion, and confirms completely the experiments of Woroschiloff and those of Ott, that the lateral columns only contain motor and sensory fibres, Ott believing with Schiff that the posterior columns contain tactile fibres. Further, the polarizing tests are, to my mind, by no means so conclusive as those made by microscopic section. Prof. F. Schultze* has made some very

* *Pflüger's Archiv*, Bd. 22.

pertinent experiments with the polarizer, which cause considerable doubt to exist as to the value of this method of investigation. I cannot see what traumatisms have done where I have divided everything except one lateral column, and the animal, a few hours afterward, had sensibility and voluntary movement. There is no need of allowing the animal to live in order to show that the lateral columns conduct motion and sensation. That the traumatisms might not affect other results, I made experiments on animals who lived for a considerable time.

Method.—Kittens were selected, etherized, and the cord bared at the junction of the dorsal and lumbræ; the skin was divided vertically in the median line, the tissues on each side of the spinous processes of the vertebræ being held away by weighted hooks. The spinous process was denuded by a sharp scraper, and snipped off with a pair of bone forceps. After this, the transverse processes were carefully denuded of their soft tissues, and the vertebræ broken down with a bone forceps and knife, the bones of the kitten being quite soft. The spinal dura mater was now exposed, and divided by a forceps and small knife. The columns of the cord were then divided by a Cooper bistoury. Any hemorrhage following was checked with absorbent cotton. The wound was closed with thread sutures, and the animal allowed to recover and live as long as possible. After its death, the cord was carefully removed, immersed for a short time in alcohol, and then in a weak solution of bichromate of ammonium. After hardening, sections were made, rendered transparent by oil of cloves, and mounted in Canada balsam.

To estimate sensibility, I used the following test: When the animal was pinched and attempted to bite, it was inferred that it had yet sensations of pain. Reflex movements were carefully distinguished from voluntary

movements. To localize the path of the sweat fibres in the lateral columns, I etherized the cat, performed tracheotomy, and laid bare the cord, not in the lumbar region, but in the dorsal above the origin of the sweat-fibres running in the abdominal sympathetic. The cord was then partially divided by means of Woroschiloff's instrument. After waiting about five hours, I divided the medulla oblongata, kept up artificial respiration, and irritated the lower end of the cut medulla with a Du Bois apparatus. The appearance or absence of sweat on the pulps of the posterior extremities was then noted. After death the cords were carefully removed and treated with reagents, in the same manner as has been described. In the cat, the sensory fibres are stated not to decussate, but the appended experiments prove that they do in part.

When I cut everything except one right lateral column, then sensation and voluntary motion were intact.

Kitten Experiment I, May 9, 1880.

Everything cut except one right lateral column, which remained intact.

May 11th.—Has no motion in posterior extremities, but has sensibility.

May 12th.—Has voluntary motion in right posterior extremity, but none in left. Has sensibility in posterior extremities. No anal rhythm.

May 15th.—Begins to use hind legs in walking (right one most). Has sensibility in posterior extremities.

May 18th.—Can support herself while standing on hind extremities as well as fore, also uses them in walking, although she cannot coördinate properly.

May 22d.—Can run as fast, and plays as lively, as any of the uninjured cats, but cannot coördinate as perfectly, one posterior extremity sometimes getting twisted on the other.

May 26th.—Wound nicely healed up. Runs around.

June 4th.—Sensibility and voluntary motion, with loss of co-ordination.

June 8th.—Died.

Kitten Experiment 2, May 20, 1880.

Everything cut except one lateral column.

May 21st.—Sensibility and motion on right side behind the section. Seems to have a good deal of pain. (Cries.)

May 22d.—Tetanic convulsions in morning; in afternoon remained quiet in box, seeming perfectly well and without pain.

May 24th.—Can support herself on hind legs; has a little motion in right hind leg, but more in left. When she walks she pulls or rather drags her posterior limbs after her.

May 27th.—No sensibility or motion in posterior extremities; drags them after her.

May 30th.—Died.

Kitten Experiment 3, May 30, 1880.

Everything cut except one lateral column.

May 31st.—Has sensibility, but no voluntary power in posterior extremities.

June 1st.—No sensibility or voluntary power in posterior extremities.

June 7th.—Died.

When I cut the lateral and posterior columns, leaving the anterior and gray matter intact, then no sensibility existed, but voluntary movement ensued.

Kitten Experiment 4, May 11, 1880.

Everything cut except anterior columns and gray matter.

May 12th.—No sensibility or voluntary motion in hind extremities.

May 15th.—No sensibility or voluntary motion in posterior extremities.

May 17th.—Has slight voluntary motion in posterior extremities, but cannot use them as a support.

May 18th.—Still has voluntary motion in posterior extremities, which she *moves* in walking or running, but cannot support herself on them. Has no sensibility in posterior extremities.

May 22d.—No sensibility or motion in posterior extremities.

May 28th.—Died.

Kitten Experiment 5, May 20th.

Everything cut except anterior columns and adjacent gray matter.

May 21st.—No sensibility or motion of posterior extremities.

May 22d.—Same as May 21st.

May 26th.—Same as above.

May 29th.—Died.

Kitten Experiment 6, May 20th.

Everything cut except anterior columns and adjacent gray matter.

May 21st.—No sensibility or motion in posterior extremities.

May 22d.—Same as above.

May 26th.—Slight voluntary power over right hind foot. No sensibility.

Evening.—Died.

Kitten Experiment 7, June 2d.

Everything cut except anterior columns and adjacent gray matter.

June 3d.—No sensibility or voluntary motion of posterior extremities.

June 4th.—No sensibility, but has slight voluntary movement in posterior extremities.

June 7th.—Died.

When I divided the gray matter and posterior columns then sensibility and motion were intact.

Kitten Experiment 8, May 30th.

Gray matter and posterior columns divided.

May 31st.—Has sensibility in both posterior extremities, and slight voluntary power in right posterior extremity.

June 1st.—Same as above.

June 4th.—No sensibility or voluntary power in posterior extremities.

June 7th.—Died.

Kitten Experiment 9, June 2d.

Gray matter cut.

June 3d.—Sensibility in posterior extremities, and slight voluntary movement on the right side posteriorly.

June 4th.—In a collapsed state.

Evening.—Died.

These experiments prove that motor and sensory fibres run in the lateral columns, that the gray matter does not conduct the sensations of pain, and that the sensory fibres in part decussate. In these experiments, after section of everything except the anterior columns and the gray matter, there was in a few cases slight voluntary motion. I do not believe the broken-down gray matter had any part in the conduction of voluntary movement. The two narrow bands adjacent to the anterior commissure of the cord are the transmitters of voluntary movement. It is evident that trauma has prevented this phenomenon from taking place in the late experiments upon this subject. The section of the inhibitory fibres in both lateral columns would explain the usual absence of voluntary movements by the anterior columns in some experiments. The inhibitory fibres being irritated depress the action of the spinal ganglia beneath, so that they do not respond to the voluntary impulses coming from above. These observations are also in accord with evidence derived from pathology, as in "descending degeneration," after an old hemiplegia, there, the fibres are degenerated in the crossed and direct pyramidal tracts. The observations of Flechsig on embryos also substantiate these observations, comparative anatomy, pathology and physiology being in complete agreement upon this question. According to the researches of Dr. Ott and myself, the following table explains the conclusions upon the physiology of the spinal cord :

Posterior columns conduct in part tactile impressions and coördination impulses.

Lateral columns conduct vaso-motor impulses, voluntary motion, sensations of pain and partly tactile sensibility ; the inner half of the middle third of the lateral columns contain mainly the inhibitory and sudorific nerves, the sudorific nerves running mainly anterior to the inhibitory.

Anterior columns conduct voluntary motion in part.

Gray matter does not directly conduct any of the above-named impressions.

That the tactile fibres cannot be demonstrated in the posterior columns except after bleeding, does not prove that they are pathological phenomena. I believe the relations of the phenomena are explained as follows: When all the spinal cord is divided except the posterior columns, all the inhibitory fibres have been irritated which inhibit the transmission of sensations below the section, whilst the irritation of the sensory nerves by the section calls into activity the monarchical inhibitory centres in the crura and thalami, which restrain the passage of sensations above the section. Now bleeding produces a state of hyperæsthesia, either by paralysis of the inhibitory ganglia or by an excitation of the spinal sensory ganglia. That inhibition is overcome in the central nervous system in some manner is shown by the rhythm of the sphincters after bleeding. In experiments on the functions of the posterior columns, the bleeding in some way antagonizes the inhibitions, and tactile impressions are readily conducted to the brain, and the animal moves when touched.

THE PATH OF THE SWEAT-FIBRES.

It has already been shown by Dr. Ott* that these fibres run in the lateral columns. My object has been to determine more accurately in what part of the lateral columns they run. The sections of the cord were made with Woroschiloff's instrument. I divided both lateral columns, and then, after waiting some hours, I irritated the medulla, but no sweat appeared upon the posterior extremities. The animals used were cats, and artificial respiration was kept up during the irritation of the medulla. When I divided

* *Journal of Physiology*, vol. ii, No. 2.

the cord as in fig. 1, then sweat appeared upon the right posterior extremity, but not upon the left. When the cord was divided as in fig. 4, everthing being cut except the

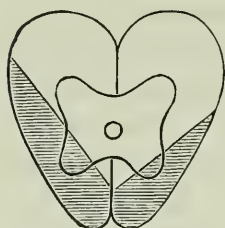


FIG. 1.



FIG. 2.

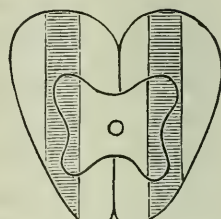


FIG. 3.

left anterior column and the anterior third of the left lateral column, then, upon medullary irritation, no sweat appeared upon the posterior extremities. If the cord was divided as in fig 3, then no sweat appeared upon the posterior extremities after irritation of medulla. These experiments show that the sweat-fibres run mainly in the inner half of the lateral columns. If the cord is divided as in fig. 2, then sweating appeared. If the cord was divided as in fig. 5, then sweating appeared more on the right side than upon the left. It is evident that the cut, in this experiment, on the left side of the cord struck the main body of the sweat-fibres. The above experiments prove

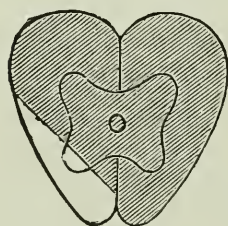


FIG. 4.

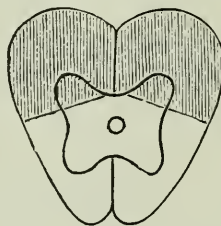


FIG. 5.

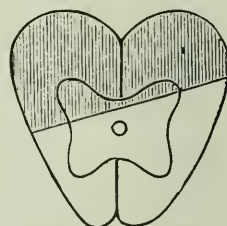


FIG. 6.

that the sweat-fibres run mainly in the inner half of the middle third of the lateral columns. When the spinal cord was divided as in fig. 6, and the medulla irritated, sweat-

ing ensued in both posterior extremities, more so on the right side than upon the left, the lateral columns of the right side being not so deeply divided. In this experiment the rhythm of the sphincters was present, showing that the sweat-fibres mainly run anterior to the inhibitory.

ACTION OF DRUGS ON THE SWEAT CENTRES.

The effect of drugs on the sweat centres is a subject which is yet to be worked out in the main. A few drugs have been worked out by Luchsinger, Nawrocki, Ott and myself. Ott has shown that after a sweat-fibre in the sciatic has degenerated and its irritation by faradic current produces no effect, the use of muscarin still called out sweat in that foot. The following drugs, bromide of ethyl, piscidia erythrina, aconitia and lobelia, have been investigated. My method of procedure was as follows: Cats were selected, the sciatic divided, and the drug given either subcutaneously or by the jugular; then the posterior extremities were watched as to their sweat secretion. Artificial respiration was kept up lest an excess of carbonic anhydride would stimulate the sweat centres and confuse the result. I shall give here only a few of the many experiments made with different drugs.

Bromide of Ethyl.

This new anæsthetic causes sweating, and it was desired to determine if it was due to a central or peripheral stimulation.

Experiment, kitten.—Left sciatic was divided, then it was ethylized, and it was found that no sweating appeared in the left posterior extremity, while sweating, to a considerable degree, did take place in all the others. Artificial respiration was kept up to eliminate an excess of carbonic anhydride. This experiment proves that bromide of ethyl

mainly excites sweat by a stimulant action on the sweat centres located in the spinal cord.

Piscidia Erythrina.

This new narcotic was tested as follows :

Experiment, kitten.—Left sciatic divided, subcutaneous injection of half teaspoonful fluid extract piscidia erythrina. All the extremities sweat except the one whose sciatic is divided.

This shows that piscidia erythrina acts partly by a central stimulation.

Aconitia.

Experiment, kitten.—Left posterior extremity has its sciatic divided.

1.40 P.M.—Subcutaneous injection $\frac{1}{4}$ grain aconitia in water.

1.55 P.M.—Subcutaneous injection $\frac{1}{4}$ grain aconitia in water.

2.09 P.M.—Cries and bites.

2.15 P.M.—Subcutaneous injection $\frac{1}{4}$ grain aconitia in water.

2.20 P.M.—Profuse salivation.

2.28 P.M.—Sweating in all extremities except the one whose sciatic is divided.

2.40 P.M.—Tracheotomy performed, and artificial respiration was resorted to, proving that aconitia acts by an excitant action of the sweat centres.

2.48 P.M.—Atropia solution administered subcutaneously caused the feet to become dry.

Lobelina.

Experiment, kitten, at 12 M.—One sciatic divided, and one drop of the acetate of lobelina (in water) injected into the central end of the carotid, toward the brain. Sweating occurred in all the extremities except the one in which the sciatic was divided.

12.22 P.M.—Another injection of acetate of lobelina given subcutaneously.

12.28 P.M.—Sweating ensued in all the extremities.

This experiment proves that lobelina can excite sweating by a peripheral action.

The following experiment was then performed :

Experiment, kitten.—Left sciatic divided and left to degenerate. One week after section of this nerve the peripheral end was irritated by the induction current of a Du Bois apparatus, which produced no sweating in the attached foot.

1.20 P.M.—Fluid extract lobelina given subcutaneously. Profuse sweating occurred in all extremities except the one whose sciatic had been divided.

1.25 P.M.—Second injection fluid extract lobelina with same result.

2.20 P.M.—Third injection fluid extract lobelina.

2.30 P.M.—Sweats in all extremities.

This experiment proves that lobelina can excite sweating in a foot whose sciatic has degenerated. Ott has already proved that muscarin acts in a similar manner.

Veratrum Viride.

Expt., kitten.—Left sciatic divided, tracheotomy performed and artificial respiration kept up ; one fluid drachm of fld. ext. veratrum viride was then administered subcutaneously. Sweating ensued in all the extremities except the one with sciatic cut. This experiment proves that veratrum viride mainly excites sweating by a central action.

PONTAL CONVULSIONS.—THEIR INHIBITION.

It has already been shown by Nothnagel that injections of chromic acid into the medulla and pons excited convulsions of an epileptiform character. In a cat, I injected a

few drops of chromic acid into the pons at the junction of the medulla oblongata, after which convulsions of the posterior extremities commenced. They began slowly, reached a maximum, and then decreased. Their number was about 120-140 per minute, alternating in each posterior extremity, then becoming quiet for a short time.

Fig. 7 (see opposite page) gives a graphic record of the convulsive movements. They were made by attaching a posterior extremity to a Marey's myograph registering on a drum of a Marey-Secretan apparatus. While these convulsions were going on, I discovered a means of arresting them, which has hitherto remained unnoticed. I found that by pinching the ear of the cat the convulsions decreased and were arrested.

INFLUENCE OF AN IRRITANT INJECTION IN DIFFERENT PARTS OF THE BRAIN ON THE MOVEMENTS AND SECRETIONS.

1. An injection of chromic acid about the left middle cerebellar crus determined movements of rotation about the long axis of the animal, from the side of the lesion toward the uninjured side.

2. An injection of chromic acid into the right thalamus and right side of the corpus callosum caused dilatation of the pupils, straddling movements of the posterior extremities; cries considerably; diagonal sweating, that is, the right fore paw and left hind paw sweat the most.

3. An injection of chromic acid into the left side of the pons at its junction with the medulla caused the head to turn to the right and upward; the animal lost all coördination; posterior extremities have alternate epileptiform convulsions, anterior extremities relaxed; places hind feet in rear of head; pupils contracted.

4. An injection of chromic acid into both optic thalami and right side of nates caused straddling movement of the



FIG. 7.

posterior extremities, want of coördination, rhythmical movements of left posterior extremity; pupils dilated; goes to left in progression; rhythm of sphincter ani; seems blind; cries during a considerable part of the time; trembling of whole body; when walking raises posterior extremities nearly to body; body twisted to right; raises hind feet into the air, and walks on anterior extremities.

5. An injection of chromic acid into the right and left corpora striata had no effect.

6. An injection of chromic acid into the right optic thalamus and right natis and testis caused the animal to roll from right to left; extension of the left forepaw; head twisted to the right. No difference in sweat secretion.

7. An injection of chromic acid into the middle of the right optic thalamus and part of left caused paralysis of the left posterior extremity; moves toward left; sweats most on left side. Can't coördinate.

8. An injection of chromic acid into the right lobe of the cerebellum and posterior surface of right natis, the animal goes to the right; the feet are dry; rhythm of sphincter ani preserved: pupils dilated; convulsive movements of anterior extremities.

9. An injection of chromic acid into the right cerebellar peduncle, the right side of pons and cerebellum, then profuse sweating ensued. Oscillation of eyeballs, and rapid breathing.

10. An injection of chromic acid causing a lesion of the right natis and testis and right lobe of cerebellum; the right pupil was dilated, the left contracted; tonic retraction of the head; mouth thrown to the left; tonic extension of the anterior extremities; moves to the left; anterior extremities stiff; feet dry.

11. An injection of chromic acid into the middle lobe of the cerebellum down to the pons Varolii, then retrograde

movements ensue; falls to either side; both pupils contracted; feet moist.

12. An injection of chromic acid into the corpora quadrigemina, anterior surface of cerebellum, and optic thalamus superficially, expirations are inhibited. Makes frequent inspirations.

13. An injection of chromic acid into the iter a tertio ad quartum ventriculum causes the animal to fall on either side. No expiration; jerking inspiration; pupils dilated; no rhythm; feet dry.

14. An injection of chromic acid into the right optic thalamus and right corpora striata causes a dilatation of the pupils; no coördination or voluntary movement; sweating normal.

15. An injection of chromic acid into the cerebellum and right side of the corpora quadrigemina causes the animal to go to the right; pupils normal; want of coördination; feet nearly dry; no anal rhythm.

Appended are the experiments upon which the above observations are based:

Cat Experiment 1, May 20, 1879 (4 P. M.).

Two drops of a one-per-cent. solution of chromic acid administered on right side of the head, below and back of the ear.

Symptoms.—Tendency to go from left to right; cannot walk; lies on belly; feet extended. Defecation taken place. Extension of right paw. Voluntary movements over right fore paw and right hind paw. Circular movement of whole axis from left to right. Sensation perfect in both posterior extremities. Right hind paw sweats more than left. Left fore paw sweats most.

4.30 P. M.—Profuse salivation; commencing to get voluntary power over all extremities, especially on right side and in right fore paw.

5.30 P. M.—Animal lies in stupid state, but on pinching tail, arouses and cries.

May 21st.—Has better use of right extremities than yesterday. No change in color of feet (vaso motor). Can move left extremi-

ties, but has not the power in them to raise herself. Right hind paw and left fore paw sweat more than the other extremities. Seems to be conscious the entire time.

In cage, lies still if left to itself, but tries to walk out of the way when handled. When out of cage, tries its best to walk, even if not touched, and drags itself along by means of its right fore and hind paws. Nurses a little.

May 22d.—Remains perfectly conscious ; tries to walk, pulling itself along by means of its right extremities ; nurses well ; sweating remains same as before, although not in such a marked degree.

May 23d.—Better use of right extremities than before, and improving generally.

May 24th.—Symptoms the same.

May 25th.—Symptoms the same.

May 26th.—Feet do not sweat more than normal ; seems perfectly well (with the exception of the paralysis). Other symptoms the same.

May 27th.—Symptoms the same.

May 28th.—*Post-mortem* : Lesions in left lobe of cerebellum, near left cerebellar crus, just behind left nates.

Cat Experiment 2, May 23, 1879.

Two drops of a one-per-cent. solution of chromic acid injected into brain.

Symptoms.—Cat immediately walks, spreading her hind legs wide apart ; lies down and cries ; makes no attempt to get up ; lies in a stupor ; when aroused and stood on its feet, cries very loudly for a moment or two, and then passes into the stupor again. Makes no attempt to walk when stood on feet ; does not seem perfectly conscious of where it is, but only of pain (when aroused). Erector muscles of limbs seem perfectly paralyzed ; cries continually ; pupils dilated ; sphincter ani partially relaxed.

May 24th.—Symptoms the same.

May 25th.—Symptoms the same ; still cries.

May 26th.—Seems perfectly well ; cries a little ; otherwise same as above.

May 27th, 10.25 A.M.—Injection of 10 minims fluid extract jaborandi in right flank. Salivation commencing. Pupils dilated. Feet sweat profusely. Right fore paw and left hind one sweat the most. Both hind paws spread out when standing or walking.

June 13th.—Second injection of chromic acid.

Second injection into the pons.

Symptoms.—Animal lost all coördination. Head turned to right and upward. Turns body to right.

Agitation of posterior extremities. *Convulsive attack.* Fore extremities relaxed and motionless during the convulsive attack of hind extremities. Places hind paws on back of neck. The convulsive movements begin slowly, reach a maximum, and then decrease. They are about 120–140 per minute. Posterior extremities alternate, then they become quiet for a short time, and again commence. Pinching the ear on the side where the convulsive movements take place, arrests them. Hyperæsthesia of posterior extremities. No sweating. Feet dry. No rhythm. Color of feet pale. Pupils at first very much contracted.

Post-mortem.—Injury to right corpus callosum, and superficial lesion on the inner side of right optic thalamus, from first experiment.

Result of 2d Experiment.—Lesion in upper part of medulla oblongata, on left side of floor of fourth ventricle.

Cat Experiment 3.

May 23d.—Injection of a one-per-cent. solution of chromic acid in the back part of head.

Symptoms.—Spreading of hind legs. Stands perfectly still. Want of coördination. Rhythmical movement of left hind leg. Tendency to go from right to left. Pupils dilated. Rhythmical movements of sphincter ani. Lies in a continued stupor. Does not cry when tail is pinched, but kicks. Produces a weak cry when tail is trodden on by the foot.

May 24th.—Seems to be blind; goes around in a circle from left to right, crying all the time. Stops a short time, and then goes around again. Shakes constantly, over her entire body. When she went around in a circle she spread out and lifted up her hind legs curiously (legs raised nearly to body). Goes in a corner by herself and sits down. These sittings seem to be periods of stupor, which when aroused from, she immediately goes around in a circle again, as described before. Whole body twisted toward right. Raises left hind paw when she bends to right side. Incoördination in posterior extremities. Pupils dilated. Goes around in a circle from left to right, throwing (as she walks) both posterior extremities in the air. After each period of rest succeeding the circle movement, the whole body is turned toward the right. Walks on front paws.

May 25th.—Symptoms about the same.

May 26th.—Goes around in a circle from left to right; cries; back legs spread a little apart when walking. Runs quite lively. Does not seem to suffer any. Pupils dilated.

May 27th.—Drags herself around. Seems to be entirely free from pain. Continues to go in a circle from left to right. Otherwise progressing.

May 28th.—*Post-mortem*: Superficial lesion of right and left optic thalami and right natis.

Cat Experiment 4, July 10, 1879.

Injection into the brain of the one-per-cent. solution of chromic acid. This first injection had no effect, and consequently a second injection was given.

Symptoms.—Rolls from left to right immediately after injection. Extension of left paw; periods of rest, and then rolls again. Head twisted toward right. Lies still, with head twisted as just stated. On side, unable to rise. No difference in sweat secretion.

Post-mortem.—Superficial lesion of right and left corpora striata. Deep lesion of right optic thalamus, and right natis and testis. The remaining parts intact. First injection involved corpora striata. No effect. Crura cerebri intact.

Cat Experiment 5.

July 15th.—Injection of one-per-cent. solution chromic acid.

Symptoms.—Left posterior extremity paralyzed; can't coördinate; moves to the left; paralyzed on whole left side; sweats most on left side. No rhythm. No difference in pupils.

July 16th.—Symptoms the same.

Post-mortem.—Lesion of right optic thalamus in its middle, and part of left optic thalamus.

Cat Experiment 6.

July 13th.—Injection of a *concentrated* solution chromic acid.

Symptoms.—Goes from left to right. Defecation taken place. Feet dry. Rhythm of both sphincters. Pupils widely dilated. (Right eyeball projects more than left?) Convulsive movements of anterior extremities. Urinates.

July 14th.—Very slight rhythm of sphincters. Sweats more than before, although fore feet are rather dry.

Post-mortem.—Deep lesion of right lobe of cerebellum, extending to posterior surface of right natis.

Cat Experiment 7.

July 13th.—Injection concentrated solution chromic acid.

Symptoms.—Rapid breathing. Profuse salivation. Oscillation of eyeballs; defecation taken place. Cries on pinching tail. The nystagmus disappeared on next day. Sweating normal. No rhythm at any time.

Post-mortem.—Deep lesion just in front of right cerebellar peduncle, involving right side of pons and cerebellum.

Cat Experiment 8.

July 13th.—Injection of a concentrated solution of chromic acid on right side of head.

Symptoms.—Right pupil dilated, and left contracted. Defecation taken place. Tonic retraction of head with mouth thrown to left. Tonic extension of fore feet. Moves to left. Retraction great enough to support the body; head still retracted; does not cry. Feet dry; 3d day, feet still dry.

Post-mortem.—Lesion involving nates, especially the right, and the posterior surface of testes, especially the right, and the right lobe of cerebellum.

Cat Experiment 9, July 13, 1879.

Injection of a concentrated solution chromic acid.

Symptoms.—Backward movement. Falls to either side. Defecation taken place. Both pupils contracted. On least irritation, moves fore paws normally. Feet moist. Died next day.

Post-mortem.—Lesion, middle lobe of cerebellum to pons Varolii, not involving it.

Cat Experiment 10.

July 13th.—Injection of concentrated solution chromic acid on right side of head behind right ear.

Symptoms.—Feet were moist before the injection, but afterward they almost immediately became dry. The breathing is inhibited in expiration. A cat makes frequent inspirations but no marked expirations. When the tail is slightly pinched, or even touched, the animal makes marked movements with the posterior extremities. Death took place half an hour after the injection.

Post-mortem.—Superficial portion of corpora quadrigemina mainly the seat of lesion. Anterior surface of cerebellum superficially involved. The optic thalami very superficially and slightly stained by the injection.

Cat Experiment 11.

July 15th.—Injection of concentrated solution chromic acid.

Symptoms.—Falls to left on walking ; sits still and rolls on left side ; lies on right side ; walks, falling to right and left. Cries when tail is pinched. Feet dry. Jerking inspiration ; no expiration. Pupils slightly dilated. No sphincter rhythm.

Post-mortem.—Lesion along the length of the iter a tertio ad quartum ventriculum.

Cat Experiment 12.

July 18th.—Injection of concentrated solution chromic acid.

Symptoms.—Pupils dilated ; hardly any sensibility in tail or posterior extremities. No coördination or voluntary movement. No rhythm. Sweating normal.

Post-mortem.—Lesion of left optic thalamus mainly, and a greater portion of the corpora quadrigemina on the right side.

Cat Experiment 13.

July 18th.—Injection of concentrated solution chromic acid just behind external occipital protuberance.

Symptoms.—Goes from left to right ; pupils normal ; runs around continually in a circle ; sits still, with head turned to right ; cannot stand, but still continues to go from left to right by dragging herself. Lies still on right side ; struggles to drag herself to the right, but cannot. Lies still, with head turned to right. Want of coördination.

July 19th.—Head still turned to right. On pinching tail, cries and goes around in a circle. Feet nearly dry. No rhythm at any time.

Post-mortem.—Lesion, upper and anterior portion of cerebellum, and right corpora quadrigemina.

CONTRIBUTIONS TO PSYCHIATRY.

By JAS. G. KIERNAN, M.D.,

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IV.—THE PSYCHOSES PRODUCED BY RHEUMATISM.

RHEUMATISM since the days of Sydenham has been recognized as capable of producing psychic disturbances. The first, however, to call special attention to the relations of rheumatism to the psychoses was Griesinger,¹ who found that rheumatism produced not only an acute but also a chronic form of insanity; that this was unattended by fever and characterized by depression amounting sometimes almost to melancholia attonita, followed by or alternated with maniacal excitement, and that at times choreic movements were present, prognosis being most favorable in the acute cases. Fleming² has expressed very similar opinions. Skae³ claims to have noticed in 1845 a case of insanity, due to rheumatism, which presented the following phenomena: The patient was at first delirious, then passed into a condition of melancholia attonita, then became violent, and after calming down expressed ungrounded suspicions. In other cases chorea was present, as also hallucinations of taste and touch. Skae regards the psychoses from rheumatism as being about as well defined as progressive paresis, and as having a favorable prognosis. Mesnet⁴ was the first to use the term rheumatismal insanity,

giving under that head cases very similar to those of Griesinger. Delieux,⁵ from one case much resembling Skae's, draws conclusions very similar to those of that author. Trousseau⁶ divides the cerebral complications of rheumatism into delirious, meningitic, hydrocephalic and apoplectic, claiming that hereditary predisposition is *always* present. Simon⁷ draws about the same conclusion regarding the rheumatismal psychoses as Griesinger. Sander⁸ cites Griesinger's conclusions as expressing his own views, and gives, in addition, several cases where rheumatism has led to apparent recovery from insanity. Wille⁹ comes to substantially the same conclusions as Sander, citing, in addition, a case where disappearance of the rheumatic fever was followed by a change in the psychical symptoms. Besser¹⁰ expresses about the same opinions, as also does Girard.¹¹ Kræpiliner,¹² who has made a very careful examination of sixty-three cases of insanity due to rheumatism, claims that at certain seasons cerebral complications of rheumatism are more frequent, so that cases may accumulate in a short period, although unknown for a long time before (they are said by Rigler to be more frequent in Turkey), and that rheumatismal insanity is divisible into the following classes: First, the hyperpyretic form, the most acute variety, the initial symptoms of which are insomnia, talking in sleep, slight delirium, followed by severe delirium later; after a rise in the temperature death results; with continued rise in the temperature the prognosis is bad, only eighteen per cent. recovering; the disease is sometimes complicated by facial spasm. Second, less acute delirious cases occurring during the first week of the disease, rarely during the second week; usually comes on with maniacal excitement at times, though rarely with melancholic frenzy; collapse or death occurs in over one-half the cases. Choreic complications

occurred in a few cases. Three cases recovered after spontaneous epistaxis. Third, a form which requires for its production, in addition to the exciting cause—rheumatism,—certain predisposing causes—anæmia, alcohol or heredity. This form is divisible into two great symptomatological groups. I. Active melancholia, with fright and suicidal tendencies, sometimes accompanied with choreic movements and vertigo. The prognosis is not very favorable. II. The other symptomatological group lasts three or four months, presenting symptoms of confusion with depression, sometimes chorea and sitophobia, *always* with hallucinations. Four cases recovered; one died. Vaillard,¹³ Guislain,¹⁴ Clouston,¹⁵ Pauli,¹⁶ Posner,¹⁷ Meissner¹⁸ and Kelp¹⁹ describe cases of melancholia attonita due to rheumatism. Voisin²⁰ and Jacoud²¹ cite cases of progressive paresis due to rheumatism.

From the predominance of opinion among the authorities cited, it would appear that rheumatism does give rise to psychoses; that these are usually of a depressing type, but that, according to some, progressive paresis is produced by the disease.

The cases coming under my observation are eighteen in number, and for purposes of comparison I have divided them into three classes: First, those of an acute type ending in either recovery, death or slight dementia. Secondly, those which culminated in progressive paresis. Finally, those in which rheumatism complicated other psychoses.

CLASS FIRST.—*Cases of an acute character ending in either recovery, slight dementia, or death.*

CASE I.—T. O'M., æt. 40. Father and sister died insane; was under treatment at Bellevue Hospital for acute articular rheumatism with high fever. The joint affection together with the fever disappeared soon after a large dose of sodium salicy-

late, the patient being in a short time attacked by delirium. He wished to escape from dogs, which he said were pursuing him, called for a gun to shoot them, and was very restless. In the course of a week he was transferred to the asylum, where he remained in about the same condition for three days. His temperature on admission was 98° , but it soon after rose to 102° . The deliriums, previously of a depressing type, became rather optimistic, varied by crude suspicions about the intentions of the bystanders. The patient was placed under \mathcal{R} kali iod., kali bromid., chloral hydrat., vin. colchici, aa 8. Aqua qs. ad 96. M. 3 ss omne tertia hora. This treatment was not without effect on the delirium, as the patient became quieter, although not more lucid. He never fully regained his normal mental condition, dying five weeks after admission. No autopsy.

CASE 2.—Jno. G., æt. 50, admitted from the Tombs in a state of violent delirium, much resembling that of alcohol. The patient, who has a brother insane, had been perfectly well up to a week prior to admission at the Tombs, when he was attacked by rheumatism involving the knees, ankles and wrist, accompanied by a high fever. The third day after the appearance of the fever, the patient was exceedingly delirious; home treatment was for a time pursued, but his violent attempts rendered transfer to an asylum necessary. On admission the patient had a temperature of 101° F. His knees, ankles and wrists were swollen. Psychically he was much agitated and presented hallucinations of taste, hearing and sight. The day after admission his temperature rose to 105° F.; his agitation increased, he being with difficulty in bed, desiring to *get up continually* and drive off a legion of devils pursuing him; he refused to take egg nogg on the ground that it *tasted* and *looked* like blood. He was placed under the same treatment as the previous case. Within three days after this the patient became comparatively rational, and by the end of the second week the delirium had entirely disappeared. The patient soon began to improve physically, and was finally discharged. Recovered four weeks after.

CASE 3.—Jno. F. McK., æt. 40, intemperate, a pauper workhouse man employed about the asylum, was attacked by acute articular rheumatism, which, however, presented nothing abnormal for about two days, when his temperature rose suddenly to 106° F., falling on the same day to 99° , but followed by endocarditis, after the pronounced symptoms of which, the patient complained of being poisoned, and said that workhouse women entered his

room to stick pins in him. The patient was at length committed to the asylum and placed under a similar treatment to the other cases just mentioned. He recovered, but exhibited some little loss of memory.

These cases correspond in some respects to Kræpiliner's acute hyperpyretic form, but resemble most his second variety. What rôle the salicylate of soda played in the first case it is very difficult to ascertain; according to certain cases recently reported,²² the remedy has seemed to play a part in the production of rheumatic delirium. In their length and the presence of hallucinations, these cases somewhat approximate Kræpiliner's third group, as they also do in the presence of heredity and alcohol as predisposing causes. The cases are too few to draw any conclusion as to the influence of age. One observation of Kræpiliner's,²³ that diseases of the heart produced peculiar effects on the delusions, is apparently corroborated by the third case, where the existence of cardiac lesion was accompanied with delusions of poisoning. These cases, however, taken as a whole, cannot be said to completely corroborate either Griesinger, Sander, Fleming, Skae or Kræpiliner, although more nearly agreeing with the last mentioned.

CLASS SECOND.—*Cases culminating in progressive paresis.*

CASE I.—J. McB., æt. 40, Celtic, admitted to N. Y. C. Asylum for the Insane, 1873, then in a typical condition of melancholia attonita. About a week previous the patient had been under treatment for acute articular rheumatism. The present mental condition made its appearance soon after the disappearance of the fever by which the joint affection was accompanied. For three days after admission the patient remained the same. On the fourth day he became excited, charged the attendant with cutting his arm off, and complained that his food was poisoned. This condition was accompanied by insomnia and persisted for three days, the patient sinking once more into a condition of melancholia attonita. In the course of a week following, choreic movements were manifest on the right side, which persisted for ten days, the patient's

mental condition remaining the same. The week following, these movements disappeared, and the patient became markedly excited, was very suspicious about his food, and claimed, as before, that his arm was cut off and that he was watched by attendants having evil designs on his person. This mental condition continued three weeks, and was then replaced by one of an acutely maniacal nature in which ideas of suspicion formed a prominent part of the patient's mental life. The patient gradually quieted down, sinking as before into a condition of melancholia attonita. In this state the patient remained for six months, when he suddenly brightened up and became nearly rational, his manner only being at all peculiar; he was discharged to the care of friends after eight months of treatment. In 1875 he was again admitted, and it was then ascertained that he had a brother insane and that a grand-uncle died insane. The patient now displayed marked insanity of manner, had well-marked systematized²⁴ delusions of persecution on the part of his relatives and his partners. He had erect straight hair and showed slight tendency to incoherence. The patient took food very suspiciously. There were not any hallucinations to be detected. He remained in the asylum, without change in his condition, for a month, when he was discharged to his friends to be taken to Europe. In 1877 the patient was again admitted and presented all the mental and physical symptoms of progressive paresis tinged by slight traces of his former condition. He had marked hyperæsthesia of the lower extremities, but these were at times anæsthetic, and he then complained that his feet had been cut off. He remained under my charge for about a year, and at the time I left the asylum the progressive paresis was pursuing its usual course.

CASE 2.—T. O. B., Celtic, æt. 41, was admitted to the New York City Asylum for the Insane, in 1877, with the following history: During the previous year (1876) he had been attacked by acute articular rheumatism, and in a delirium consequent on the fever he had attacked his sister and accused her of being in a plot against his life, refusing to eat or drink from her hands. He had hallucinations of hearing, and was at times extremely violent. The delusions and hallucinations already mentioned remained for two months, and then the patient's condition changed into one of stupor. Six weeks after, the patient became maniacal and depressed alternately. These symptoms all disappeared, leaving the patient, as his friends styled it, "cranky," but able to carry on his usual avocation. Six months thereafter he was treated at an

asylum in New Jersey, having what, from his sister's description, were evidently systematized delusions of persecution. In this asylum he remained three months, when his sister took him home, without apparent change, where he remained till a month prior to admission. On admission, the patient was found to have well-marked systematized delusions of persecution, somewhat weakened by the existing progressive paresis. His pupils were "pin-hole" contracted, but dilated unequally. There was some hesitancy in speech. The facial folds were unequal. The patient had marked insanity of manner and some ill-defined unsystematized delusions of grandeur. The patient's gait became impaired, and, having some convulsions which reduced him very much, he was taken out to die, by his sister, six months after admission.

CASE 3.—T. McG., æt. 45, Celtic, had been attacked by acute articular rheumatism early in the year 1875. The œdema of the joints suddenly disappeared, and he was almost immediately seized by a violent delirium, during which he claimed that his hands had been cut off, and that his food was poisoned, and that people were using instruments to burn the side of his body. He gradually passed from this delirium into a condition of melancholia attonita, from which he emerged, a month before admission, into a condition presenting marked insanity of manner with well-defined systematized delusions, together with well-defined hallucinations of hearing difficult to elicit. His delusions chiefly concerned his wife and her cousin, whom he accused of cutting his feet off and attempting to poison him. During six months these delusions continued exceedingly vivid, but at the expiration of that period the patient's manner became less disagreeably suspicious and he conversed with more freedom. His delusions of persecution were less well-defined, and the patient seemed, to my intense surprise, on the fair way to recovery. His pupils were, however, noticed to be unequal, and optimistic delusions began to make their appearance, followed by the other symptoms, mental and physical, of progressive paresis. He was soon after this removed to an Irish asylum, where a brother and sister were under treatment.

CASE 4.—J. G., æt. 28, American, was admitted to the New York City Asylum for the Insane with a history of having been attacked by rheumatism, during the fever of which he was seized by delirium, passing soon after into a condition of melancholia attonita, in which he remained three years. During 1874 it began to be noticed, first, that there was more intelligence about the patient's expression, then that he took food freely, and finally that

he conversed with the other patients. His facial folds were then noticed to be unequal; then his speech became hesitant, his tongue tremulous and his pupils unequal. On examination he was found to have delusions of an optimistic type. He finally developed into a well-marked case of paresis, dying early in March, 1875, of phthisis.

CASE 5.—J. D., Ger., æt. 50, was admitted to the N. Y. City Asylum in a violently excited condition. The patient's wife gave the following history: The patient's father and grandfather died during an epileptic attack, and the patient's eldest brother is an epileptic. The patient has been perfectly well up to three weeks before admission, when he was attacked by acute articular rheumatism. The swelling of the joints was at times extreme, but after a month's duration suddenly disappeared, to be followed by a change to the mental condition in which the patient was admitted. The patient continued excited and violent, the violence being rather of the nature of melancholic frenzy. There were marked hallucinations present of a very distressing character. The patient continued excited for about three weeks after admission, when he suddenly passed into a cataleptoid condition with great waxy flexibility. In this state he remained for three years, when his pupils became unequal, his tongue tremulous, and an expression of content pervaded his face. He did not, however, speak until about three months had elapsed, when he talked loudly about his wealth in Germany; his speech was hesitant, and he had a great tendency to omit words. He passed through the usual stages of progressive paresis, dying a year after the appearance of the parietic symptoms. No autopsy was obtainable.

CASE 6.—C. L., æt. 46, Ger., was attacked by acute articular rheumatism, which was followed by acute melancholic frenzy on the sudden disappearance of the joint affection, which gradually shaded into a state where well-marked systematized delusions of persecution with hallucinations predominated. This condition continued for a year and then passed into general paresis, in which state he was admitted to the asylum. He was there treated with conium, chloral hydrate, kali iod. and colchicum, and after six months' treatment was so far recovered as to be discharged to his usual avocation. When met with five years after his discharge, presented no evidence, mental or physical, of general paresis or other psychosis.

It is evident these cases have one thing in common, and that this, the peculiar systematized delusions of persecution which marked one stage of the disease. These delusions in their character strongly resemble those of the chronic type of alcoholic insanity, which I cannot agree with Spitzka²⁴ in regarding as unsystematized, since many of them are supported with as much detail as are those of any form of monomania. It is true there is a large class of chronic cases of alcoholic insanity which have decidedly unsystematized delusions of a character very similar, but the element of dementia is strong enough in those cases to prevent confusion with the other class. These cases corroborate Griesinger, Fleming and Kræpiliner to the extent of showing that rheumatism may give rise to chronic types of insanity, but in their earlier stages most resemble Skae's cases. In their conclusion they most agree with Jaccoud's and Voisin's opinions. At the same time, the infrequency of chorea and the strongly-marked systematized delusions of persecution give them characters not hitherto described as existing in insanity from rheumatism. From these cases I pass to the third class, cases in which rheumatism has exerted an apparently beneficial effect on already existing insanity.

CLASS THIRD.—*Cases in which rheumatism complicated other psychoses.*

CASE 1.—*Chronic mania with confusion.*

A patient was attacked by rheumatism while laboring under the form of disease above given, and during the rheumatic hyperpyrexia the patient became perfectly rational, resuming his old condition on recovery.

CASE 2.—*Hebephreniac dementia.*

A patient suffering under the above form of insanity was attacked with acute articular rheumatism with much swelling of the joints. The œdema of the joints suddenly disappeared, and a condition of high fever succeeded. During this the patient was

very quiet and subdued in manner, talked rationally, and was careful about his dress and person. This improvement was but temporary in character, the patient again becoming demented on recovery.

CASE 3.—*Melancholia attonita*.

A case of this affection was attacked by acute articular rheumatism followed by a fever, the temperature reaching 102°. The patient during this fever was decidedly rational, and after recovery from the rheumatism fully recovered from his melancholia attonita.

CASE 4.—*Epileptic dementia*.

P. O'F. was attacked by epilepsy at the age of ten, and had been in the asylum as a case of epileptic dementia for ten years. He was attacked by rheumatism, during the fever of which the patient was rational but rather juvenile in ideas, but soon after recovery resumed his usual dementia.

CASE 5.—*Monomania*.

G. J. A case of this disease was attacked by rheumatism, during the progress of which his delusive ideas entirely disappeared, but again resumed their sway on the patient's recovery from rheumatism.

CASE 6.—*Querulent melancholia*.

R. J. F. A case of this kind was attacked by rheumatism, during the prevalence of which he became very optimistic in ideas. The optimism continued after recovery, the patient finally becoming a case of progressive paresis.

The percentage of cases in which rheumatism has affected the mental condition of patients is, in my experience, about equal to that of Kræpiliner, five per cent. Simon and Kelp have, however, found a much lower percentage.

From these cases it seems to me the following conclusions follow:

First.—That rheumatism produces certain psychical changes.

Second.—That these changes are either of an acute or temporary kind, or else of a chronic type.

Third.—That the chronic type passes through three stages: a stage of melancholia, either of the atonic variety or with unsystematized delusions; this condition is fol-

owed by one in which the delusions are decidedly of a systematized type, to which succeeds a mental state closely resembling general paresis.

Fourth.—That rheumatism often produces apparent improvement in the chronic psychoses complicated by it, which is usually but temporary in character.

Fifth.—That the acute form has usually a good prognosis as regards recovery, but is much more fatal than the chronic form.

Sixth.—That the chronic form has a bad prognosis as regards ultimate recovery.

Seventh.—That heredity here, as in other psychoses, plays an important part as a predisposing cause.

Eighth.—That intercurrent cardiac affections apparently exercise some influence on the nature of the delusions.

V.—THE PSYCHOSES PRODUCED BY HEAT.

The literature of this subject is exceedingly scanty. Bailarger,²⁵ Voisin,²⁶ Griesinger,²⁷ Ellis,²⁸ Bucknill and Tuke,²⁹ and Moreau,³⁰ are all that have made even brief references to it. David Skae includes this variety under his "Traumatic Insanity," concerning which he quotes and endorses the following conclusions from Francis Skae:

"First.—Traumatic insanity is generally characterized at the commencement by maniacal excitement, varying in intensity and character.

"Second.—The excitement is succeeded by a chronic condition, often lasting many years, when the patient is *irritable, suspicious, and dangerous* to others.

"Third.—In many such cases distinct homicidal impulses exist.

"Fourth.—The characteristic delusions of this form of insanity are those of *pride, self-esteem* and suspicion, melancholia being but rarely present.

"Fifth.—This form is rarely recovered from, and has tendency to pass into dementia and terminate fatally by brain disease.

"Sixth.—That the symptoms, progress and termination of this insanity are distinctive and characteristic to enable it to be considered as a distinct type of disease."

I have seen, in all, ten cases due to heat, of which five were directly due to insolation.

The cases are as follows:

CASE 1.—D. McC, æt. 39, Irish, fireman, was sunstruck during 1872, this being followed by an acute attack of meningitis; when the acute symptoms of which had passed away, the patient was very dignified and haughty, and was exceedingly suspicious of his fellow-workmen, whose familiarity he resented. An attempt on the life of one of them led to his incarceration in the asylum, where he was regarded as a case of intellectual chronic mania with systematized depressing delusions. During 1874, the patient's insanity of manner, which had hitherto been well marked, began to disappear, and he manifested optimistic, unsystematized delusions of a rather stupid type. He claimed to be the chief fireman of the world, with a salary of \$15,000,000 per annum. His pupils were unequal, his enunciation was impaired, and his tongue was tremulous. He had a series of convulsions, which were checked by ergot, but being seized by pneumonia, died during 1875. The brain showed marked meningitis of the convexity, on the autopsy, but decayed while undergoing hardening.

CASE 2.—P. C., æt. 40, clergyman, unmarried, was sunstruck during the summer of 1873, but by the fall of that year had apparently recovered, though he became irritable, and finally had to be deposed from the priesthood because of the existence of delusions of persecution and hallucinations of vision. His condition at this time was, according to a medical observer, that of a case of chronic intellectual mania with marked insanity of manner and depressing delusions, mingled with which were ideas of his own superior ability. During the year 1874 he began to have some hesitancy in speech, and pilfered articles of trifling value. At length he became markedly indecent, and transfer to the asylum was rendered necessary. On admission, the patient had marked insanity of manner, with some faint delusions of persecution,

but his general mental condition was that of a paretic, he having stupid, unsystematized delusions that he was Pope and at the same time President of the United States. His pupils were unequal, his lips tremulous, there was a slight hesitancy in speech and inequality of the facial folds. During the fall of 1874 he had several convulsions, which were treated by ergot with apparently beneficial results as regards his mental condition, although his extreme uncleanliness still persisted. The patient is still alive, and varies only from the average paretic in being a masturbator, a peculiarity common to all insane theologians.

CASE 3.—Jno. P., æt. 43, American, clerk, was admitted to New York City Asylum for the Insane during 1873 with the history of having been sunstruck three months before, on recovery from which the patient was found to be exceedingly suspicious, timid and irritable. He at this time had hallucinations of taste, claiming that he could detect arsenic in his food. On admission to the asylum he had marked delusions of persecution and hallucinations of taste, hearing and sight. During 1874 the hallucinations of taste and sight disappeared, together with the insanity of manner, the other hallucinations being very illy defined. He became slightly hesitant in speech, and his pupils responded unequally to light. In October, 1874, he had a convulsion, after which he claimed to be worth millions of dollars; his face became soggy, and his gait was somewhat impaired. In the course of the next two weeks he had another convulsion, and was placed under ergot, resulting in a temporary improvement in his mental condition. He died during 1877, four years after the beginning of the disease, from an intercurrent lung disease.

CASE 4.—Jos. T., æt. 42, American, was sunstruck during the year 1872, which was followed by meningitis; after the acute symptoms of which had disappeared, the patient was found to require asylum custody because of his marked delusions of persecution, his suspicions and violent disposition. He remained in this condition of excitement during 1872 and 1873, and sank into a condition of dementia during 1874, from which he emerged in 1876 with all the symptoms of general paresis, dying during that year from a convulsion.

CASE 5.—Michael F., Irish, æt. 41. Patient was a cook, and during the summer of 1873 had incautiously exposed himself to the sun in the yard of his place of employment, after which he felt a little dizzy, but continued to work before a warm range for an hour, when he suddenly fell down. This was followed by an

attack of acute meningitis, the acute symptoms of which having subsided, the patient was found to be suffering from delusions of persecution. The family retained him at home for four months, during which he displayed great irritability, complained of copper being in his food, accused his wife of being in a conspiracy against him, and conducted himself in a violent manner, and was extremely dignified. He was taken to the country, but new symptoms of insanity manifesting themselves there, he was again removed to the city, finally reaching the asylum in 1874. The patient was then a typical case of general paresis. He had several convulsions during 1874, which were treated by ergot with beneficial effect. He died early in 1875 from phthisis.

CASE 6.—Jno. G., fireman, Scotch, æt. 39, employed on a river steamer, was seized by a fainting spell during a hot summer, followed by an acutely maniacal condition; on recovery from which the patient was found to have systematized delusions of persecution, which remained for three years and finally disappeared to give way to general paresis, from which the patient died three years after. The other four cases have already been cited elsewhere, for which reason there is but little necessity of quoting them here.

These cases do not display any marked evidence of heredity; they all have evidently occurred in people of middle age, and from them it seems to me that we may conclude: First, that heat, without the predisposing element of heredity, is capable of giving rise to psychoses; second, that Francis Skae's opinions are to a certain extent corroborated by them, but that for his term, brain disease, must be substituted general paresis.

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THE NERVOUS MECHANISM OF RESPIRATION.

A LECTURE DELIVERED IN THE COURSE OF PHYSIOLOGY AT THE
CHICAGO MEDICAL COLLEGE.*

BY DR. H. GRADLE.

THE anatomical details of the nerves supplying the respiratory muscles have been fully pointed out to you on a previous occasion. We learned, at that time, that they all emerge from the spinal cord at different levels. The fine coördination of the various movements concerned in breathing leads us to suspect that the various nerves are all related to one governing centre. The exact position of this centre can be learned by a series of sections through the cerebro-spinal axis. These sections must begin above, since, were we to commence below, we would cut off from the upper part of the cord the different nerves which enter it below the point of section. We can destroy or remove the various parts of the brain without interfering with the normal breathing, until we proceed downward to the medulla oblongata. Any injury done to this part, however, will influence or even arrest the respiratory movements. Since the teachings of Flourens it has been customary to speak of a respiratory centre in the medulla oblongata. Its position is immediately above the lower end of the calamus scriptorius, extending upward as far as the alæ cinereæ.

* The original lecture has been slightly condensed in some parts, so as to bring more into prominence the most recent additions to our knowledge.

Whenever this point is wounded, the breathing stops suddenly. Since the maintenance of life depends upon the continuance of breathing, the term "vital knot" was very properly chosen for this so-called respiratory centre. In fact, physiologists frequently resort to pricking the medulla with a stylet when it is desired to kill an animal very quickly. This alleged respiratory centre is really a double organ; it consists of two bilateral halves. A longitudinal section through this "vital knot," exactly in the median line, does not reveal itself in any disturbance of breathing. In other words, each half can act independently of the other, but as long as no other mutilation exists the two act in concert.

If, however, one or both pneumogastric nerves are divided, this harmony of the two sides of the body ceases, and the respiratory movements of the two sides of the chest and of the two halves of the diaphragm occur no longer synchronously.*

Since section of one vagus alone does not disturb the harmony of the two sides as long as the "vital knot" has not been bisected, we conclude that the normal coördination of the two sides is enforced by transverse nerve-fibres connecting the two halves of the respiratory centre.

But strangely enough there exists no anatomical basis for this alleged respiratory centre. At this spot, described above, no ganglionic cells are found to justify the term nerve-centre from an anatomical standpoint. Dissection reveals only bundles of nerve-fibres on either side of the median line, which fasciculi interchange fibres by decussation. These bundles can be traced from the origin of the cranial nerves arising in the medulla oblongata down into the cervical part of the spinal cord. They thus connect the nuclei of some of the cranial nerves, especially those of the

* Langendorff, *Centralbl. f. d. Med. Wissensch.*, 1879, No. 51.

vagus, with the origin of the motor nerves supplying the respiratory muscles. The real respiratory centre has lately been shown to be much larger in extent than the spot termed "vital knot."

Some observations made in Stricker's laboratory proved that after severing the cord from the medulla oblongata a few irregular respiratory movements could yet occur.* Especially was this the case on increasing the irritability of the spinal cord by means of strychnia. We have learned previously, in connection with the vaso-motor centres, that division of the spinal cord will place the lower end in a state of shock or temporary paralysis which, in mammals, requires days to recover from. A high division of the cord does not permit the animal to live long enough to recover, but an approach to the normal state can be produced by poisoning with small quantities of strychnia. Hence spinal centres may not reveal their existence after their separation from the higher centres, unless we exalt artificially their irritability.

This condition of shock owes its origin, at least in part, to the excitation of inhibitory fibres by the mechanical section. You will learn later about the existence of fibres coming from the brain downward, which, when active, diminish the irritability of the spinal cord below. This inhibitory system is imperfectly developed at birth. Hence, in very young animals, the spinal cord is not so much depressed by severing it from the medulla oblongata. In new-born cats and dogs Lautenbach succeeded in keeping up the respiratory movements after destruction of the medulla oblongata, at least for a number of minutes.†

By selecting new-born cats and rabbits for experiment, Langendorff‡ has recently succeeded in demonstrating the

* Rokitsansky, *Wiener Med. Jahrbücher*, 1874, p. 30. Schroff, *Ibid*, 1875, p. 324.

† *Philadelphia Med Times*, 1878, May 11th, p. 366.

‡ *Arch. f. (Anat. &) Physiologie*, 1880, p. 518.

spinal respiratory centres in a more positive way. If, after the separation of the cord from the medulla, artificial respiration is practised for some time, the animal will resume a perfectly normal mode of breathing in a few minutes after stopping the bellows. The constancy of the result can be increased by poisoning with minute doses of strychnia. These breathing movements, governed as they are by isolated spinal centres, are perfectly normal in extent and co-ordination. Moreover, the activity of these spinal centres can be influenced in a reflex manner by stimulation of the sensory nerves, and the results are quite comparable to the reflex disturbances of breathing which can be so easily produced in the unmutilated animal. The exact extent of the spinal respiratory centres was not determined, but they probably exist as low as the origin of the last dorsal nerves, innervating the intercostal muscles. It is best, perhaps, to drop the idea of a discrete respiratory centre, and to suppose simply that the central ends of the different nerves concerned in respiration are more or less connected with each other by association-fibres. Moreover, the points of origin of the different nerves active in normal, undisturbed breathing, must possess equal degrees of irritability, since the same stimulus throws them alike into activity. Indeed, it can even be seen that in the severed head of a young animal the respiratory movements of the nostrils agree in rhythm with those of the trunk, although the former are innervated by the isolated medulla, and the latter by the separated spinal cord (Langendorff).

The next question must be, how do the impulses reaching the respiratory muscles, originate? We have seen so many instances of reflex action in the regulations of nutritive movements as to cause us to enquire whether breathing is also a reflex process. But this can be safely denied, although it may be difficult to disprove it by direct experi-

ment. We can, of course, not cut off the respiratory centre from all sensory nerves. Any observations made on narcotized animals would likewise not be conclusive, since narcotic agents do not abolish all reflexes at one and the same time. Although breathing continues during ordinary narcosis, it will finally stop if the state of unconsciousness is pushed far enough.

The conclusive proof that breathing is not a reflex movement consists in the fact that we are acquainted with the stimulus creating the impulses in respiratory nerves, and that we know upon what organ this stimulus acts. This stimulus is the condition of the blood of the medulla oblongata, or, more properly speaking, in the respiratory centres. The activity of these centres is in exact proportion to the necessity for breathing as indicated by the arterial or venous nature of the blood sent to the centres. Whenever any impediment exists, interfering with the normal aeration of the blood, the breathing movements are exaggerated. They become both more frequent and more energetic, by reason of a larger number of muscles involved. The impediment may be of a mechanical nature, an obstacle to the passage of air into or from the lungs, or it may be an interference with the aeration of the blood, due to circulatory disturbances. The symptoms of dyspnœa or impeded breathing are the same, whether the cause is complete or partial closure of the trachea, or complete or partial obliteration of the pulmonary artery. In either case the blood is not sufficiently aerated, and the respiratory centre feels the call for a stronger ventilation, and responds to it by increased activity. We can demonstrate directly that it is only the condition of the blood in the nerve-centres which regulates the energy of breathing. If we close suddenly the four arteries supplying the brain and upper part of the cord, namely,

the carotid and vertebral arteries on both sides, most intense dyspnœa is at once manifested. The energetic movements of the chest resulting therefrom certainly ventilate the lungs thoroughly. The aeration of the blood is likewise not prevented by any obstacle, but the respiratory centres do not receive any of this arterialized blood, and hence this artificially created condition leads to the same compensatory consequences which would follow the more ordinary interferences with aeration of the blood. We find here the same adaptation of the system to variable external conditions to be encountered in other branches of physiology. The greater the difficulty of getting air, the greater will be the effort to overcome the difficulty.

In the same manner as the respiratory centre responds by increased activity to an inadequate supply of arterial blood or to blood imperfectly arterialized, so it will, on the other hand, relax in its activity when it receives a due quantity of perfectly aerated blood. The reverse of dyspnœa or labored breathing is the state of apnœa. During this condition there occur no respiratory movements, because there is no need for them. Whenever the blood reaching the respiratory centres is perfectly arterialized, the activity of these centres ceases. In other words, the stimulation of the respiratory centre is due to want of oxygen in the blood. When the bellows are vigorously used, which are connected with the dog on the table, you will notice, first of all, that the spontaneous breathing ceases, the animal yields passively to the inflation, and no movements occur except those caused mechanically by our ventilation. The animal before us is narcotized, but the same results could have been obtained in a conscious dog.

After a vigorous use of the bellows, we will interrupt the artificial respiration suddenly. You can notice no breathing occurs during the space of nearly one minute. The breath-

ing was not interfered with. It stopped simply because there was no need for it. The animal was in a state of apnœa. The blood was so perfectly arterialized by the energetic inflation as not to stimulate the respiratory centre at all.

We can perform the same experiment ourselves.

On stopping your breathing voluntarily, you will find it very difficult to maintain rest for a minute. The anguish due to the venosity of the blood compels you to resume breathing in spite of your will, but if you take a series of unusually quick and deep inspirations, you will find it easy to suspend breathing thereupon for a full minute or even longer. The blood is thereby so fully arterialized that considerable time is required before it becomes venous enough in character to stimulate the respiratory centres.

The maintenance of apnœa is not due merely to saturation of the arterial blood with oxygen, since even normally at least fifteen-sixteenths of the hæmoglobin in the arteries is combined with oxygen. But the energetic ventilation leading to apnœa necessarily renovates the residual air in the lungs more thoroughly, so as to leave a store of oxygenated air in the lungs from which the blood can draw its supply without the need of respiratory movements.*

The activity of the respiratory centres varies thus in an inverted ratio with the arterialization of the blood. The mechanism is self-regulating. The energy displayed is in proportion to the energy required to keep the blood arterialized. But how are we to explain the regular alternation of inspiratory and expiratory movements? What is the mechanism controlling the respiratory rhythm? Are we to look for separate inspiratory and expiratory centres? No satisfactory answer can yet be given to these questions.

*Gad, *Habilitätsvorlesung, Ueber Apnœa, etc.* Würzburg, 1880.

Our insight into the central mechanism is but very incomplete.

Normally, the expiratory movement is almost wholly passive. You will remember that it is due mainly to the elasticity of the lungs and the chest-walls, the only muscles involved being the internal intercostal muscles. Hence, the supposition of a separate expiratory centre is hardly necessary. The central mechanism may consist simply in alternate discharge and rest of the inspiratory centre. Moreover, no expiratory movement can be directly produced by stimulating the nerve-centres. Lately, Kronecker and Marckwald have made the following experiments: * They severed the medulla oblongata from the pons in rabbits. The breathing is thereby not disturbed if the operation succeeds. On sending induction shocks through the medulla, inspiratory movements were produced, but no expiratory efforts. Whenever the stimulation coincided with an inspiratory movement, it enforced it; whenever the current passed through the centre during expiration, it arrested it. A point of special interest in these researches was the discovery that during complete apnœa the centre did not respond to electric stimulation.

But we must not lose sight of the fact, that during dyspnœa the expiratory movements are indeed active, and that muscular contractions resulting in expiration can be produced in a reflex manner to be described later on. No explanation of these occurrences can be given.

While the total energy of respiration depends on the state of the blood, the distribution of the energy is influenced vastly by impulses reaching the respiratory centres through different nerve-strands. We see but too often the effect of emotions on breathing. The movements are suspended for a time by terror, accelerated by exciting emo-

* *Arch. f. Phys.*, Heft 5 and 6, p. 592, 1880.

tions. The sigh of relief is but a deep and slow inspiration. Dread leads, on the other hand, to increased frequency of inspiration. It is quite likely that these and numerous similar instances are due to the influence of accessory respiratory centres recently discovered in the brain by Martin and Booker.* These observers learned that there exists a spot in the gray substance around the aquæduct of Sylvius, beneath the corpora quadrigemina, irritation of which increases the frequency of breathing. This effect is really due to exalted activity of the inspiratory muscles, which do not relax fully during the brief expiratory intervals. On increasing the stimulus, the action of the inspiratory muscles becomes tetanic at last, so that the chest is kept in the inspiratory position. On shifting the electric needles, the effect ceases. The authors claim also that an expiratory centre is to be found further back near the pons, which augments in the same manner the expiratory movements. These statements have been confirmed, apparently without knowledge of Martin and Booker's results, by Christiani.† You must not suppose, however, that these centres assist in ordinary respiration. As already stated, the breathing is not altered sensibly by removing the brain.

A most important influence upon the respiratory centre is exerted by the vagus nerve. This is evident at once on severing the nerve. Division of one nerve alone does not alter the breathing, unless the medullary "vital knot" has previously been bisected longitudinally, in which case the irregularity of breathing is confined to the muscles of the same side, while the other side moves with the normal rhythm. If both nerves are divided, the breathing becomes very slow. Our dog on the table breathes about 30

* *Journal of Physiology*, vol. i, p. 370.

† *Centralblatt f. d. Med. Wiss.*, 1880, No. 15.

times a minute. Now, after having severed the pneumogastric nerves, the frequency has been reduced to 6 breaths a minute. You may notice that the retardation occurs during the inspiratory period. After a long pause, there begins a slow but very deep inspiration, sometimes persisting even as inspiratory tetanus. Suddenly it is interrupted by an expiration nearly normal, or, if anything, very sudden. Moreover, the breathing is irregular. Two successive respirations vary often appreciably in duration. But the total energy of respiration is not altered. What the inspirations lack in frequency they make up in depth. Voit has shown by actual test that the gaseous exchange of the animal is not reduced. But while the respiratory centre does enough work, the work is not distributed uniformly or advantageously. The centre lacks the regulation due to impulses sent from the lungs to the medulla through the pneumogastric nerve.

Breuer and Hering have shown that these regulating impulses originate in the lungs from mechanical causes. These observers claim that certain fibres of the vagi nerves are stimulated by expansion of the lungs, *i. e.*, by inspiration, and that these fibres check any further inspiratory movements, but favor expiration. They state further that other fibres in the same nerves are stimulated by the mechanical collapse of the lung tissue, and that these latter nerve-filaments, when active, excite a renewed inspiratory effort. The experiments upon which they base these conclusions are the following: If, in a tracheotomized animal, the lungs are inflated with bellows, and the tracheal tube be now closed to prevent collapse of the lungs, the first spontaneous movement occurring is always one of expiration, even though the lungs be but moderately distended. But if the artificial respiration be stopped during the collapsed state of the lungs, the animal follows every time with an

inspiration. This regular alternation is not dependent upon any anatomical restraint. At the end of an ordinary inspiration we can easily make a voluntary stronger inspiratory effort, and we can likewise exaggerate in depth the ordinary expiratory movement. The capital point is, that the regularity ceases on section of both pneumogastric nerves. While in the normal animal we can predict with certainty the next respiratory movement, this is no longer possible after vagotomy.

The experiments were repeated some years ago, with imperfect result, by Guttman and Gad. But, as Gad* himself admits, the fault was in the mode of observation, and especially in the employment of chloral as a means of narcosis. The chloral simply prevents the influence of the vagus upon the centre. Recently, Langendorff† has confirmed fully Breuer and Hering's views by the application of graphic methods.

The existence of such a double set of fibres, one of which arrests the inspiratory action of the centre, the other the expiratory, can be demonstrated by electric stimulation of the vagus trunk, *i. e.*, its central end after section of the trunk. Nearly twenty years ago Rosenthal pointed out that the vagus nerve possessed a function antagonistic to that of one of its branches, *viz.*: the superior laryngeal nerve. Stimulation of the latter branch with a mild current leads to diminished frequency of breathing by cutting short the inspirations and prolonging the expiratory pauses. A strong current will arrest the chest altogether in the expiratory position. Stimulation of the vagus trunk, however, below the superior laryngeal branch, leads to the opposite result. According to Rosenthal, a feeble excitation will accelerate breathing by favoring the inspirations, while a

* *Archiv f. Physiologie*, 1880, p. 7.

† *Archiv f. Physiologie*, Supplement Band, 1879, p. 48.

stronger stimulus will throw the inspiratory muscles, and especially the diaphragm, into tetanus, and thus arrest the chest in inspiration, at least for a minute or so. Whether this peculiar property of the laryngeal nerve is called into action during ordinary breathing, we do not know. We are ignorant, likewise, of the manner in which the impulses checking inspiration originate in this nerve. The existence of this function, however, has been confirmed by all observers. But not so with the trunk of the vagus. Rosenthal* himself claimed recently, that stoppage during inspiration is the constant result of stimulation of the nerve with not too strong a current. This statement formerly met with much opposition.

Later researches by other observers show that the trunk of the vagus does, after all, contain fibres which arrest breathing during expiration. Burkart† claims that such fibres exist in the inferior laryngeal nerve, and hence also in the trunk of the vagus, but that these fibres act indirectly upon the respiratory centre through the intervention of the brain. Their effect is, hence, prevented by narcosis. Even more positive statements are made by Langendorff.‡ He was able to obtain either expiratory or inspiratory arrest of breathing by electric irritation of the nerve. It is not easy to predict which result will set in. But it seems that the fibres producing arrest in expiration are not so easily fatigued as the other set, so that after prolonged stimulation inhibition of inspiration is the more constant phenomenon. The latter result occurs invariably on irritating the divided nerve by means of glycerine.

A very suggestive mode of experimentation has lately been pursued by Kronecker and Marckwald.§ They severed

* *Archiv f. Physiologie*, Supplement Band, 1880, p. 34.

† *Pflüger's Archiv*, 1878, vol. xvi, p. 427.

‡ *Königsberger Phys. Mittheilungen*, 1878, p. 33, and *Centralblatt*, 1879, No. 21.

§ *Archiv f. Physiologie*, 1880, p. 441.

the respiratory centres from their more important nerve-connections by dividing the medulla underneath the pons and cutting the two vagi. Under these circumstances the respiration is very irregular in rabbits. It was then learned that stimulation of the central end of the vagus could produce either expiration or inspiration according to the time the stimulus was applied. The inspiratory movement, however, could be more easily obtained. But if the medulla was divided so low as to check the natural breathing, or if the breathing had ceased on account of hemorrhage, a continuous faradization of the pneumogastric nerves restored the respiration.

These various facts, important as they are, do not suffice for a theory of the nervous mechanism. We can only say that the activity of the centre depends on the state of the blood, and that the regularity of the movements are influenced by the vagi nerves. But for the alternation of the inspiratory and expiratory movements, we lack, as yet, a sufficient explanation.

Not only the vagus, but nearly all sensory nerves of the body can modify the breathing movements. Sudden changes in rhythm are produced by almost any strong or painful impression. As a rule, feeble stimulation of a sensory nerve will accelerate, while intense excitation checks the breathing (Langendorff). These same changes can be obtained even after severing the spinal cord from the medulla oblongata, providing the animal still breathes. In such instances in which the shock of the cord prevents the resumption of normal breathing, stimulation of sensory nerves will aid the centres in recommencing their activity. Indeed, in practice we avail ourselves of this susceptibility of the respiratory centres to sensory impressions. Stimulation of the skin by dashing on cold water or slapping with wet cloths, has aided in the recovery of many an asphyxiated

individual. This artifice is of particular value in obstetric practice, when the child does not breathe at birth. Should such stimulation fail, the rational course would be to heighten the irritability of the respiratory centre by supplying it with arterialized blood by means of artificial stimulation. Quite recently, Goyard presented a note to the French Academy * regarding a successful method of resuscitation in the case of a still-born child. After two hours of vain endeavors with ordinary means, he plunged the child into a hot bath (45° to 50° C.), and witnessed the recovery, although the heart had stopped beating at birth.

A peculiar modification of breathing is produced by the action of heat on the sensory terminations in the skin. I refer to heat dyspnoea, commonly known as panting. It consists in an excessive frequency of respiration, the movements being, however, quite shallow. It is not a form of asphyxia, properly speaking. There exists no impediment to aeration of the blood. Although the dog may breathe 300 times a minute, its blood is in the usual state of arterialization. The frequency is due to the influence of other nerves upon the respiratory centre.

Panting does not occur to any extent in man, but readily so in animals that do not sweat. An animal devoid of sweat glands and covered with hair, like the dog, regulates its internal temperature largely by the dissipation of heat through the lungs. The more air passing through the lungs in a given time, the more heat will the animal lose in warming the inhaled air, and by evaporation from the lung surface. Hence, heat dyspnoea is a regulative provision of the economy in such animals, in order to guard against overwarming of the body. Panting is due to heating of the terminations of sensory nerves more than to overheated

* Jan. 17, 1881. *L'Union Médicale*, No. 11, 1881.

blood. Still, Fick and Goldstein claimed to have produced it by warming the blood in the carotid arteries by means of hot tubes (50° C.) placed underneath the vessels. But their deductions have been contested by Sihler.*

It is doubtful whether their method really did warm the rapid blood-current to any extent, while the panting was actually due to the pain produced by the hot tubes. Yet it is fair to assume that the heat dyspnœa may be of central origin, since we witness it during the febrile state, even though the air is cool. Sihler, however, has shown that it is ordinarily caused by heating of the skin, and that it may occur even when but a small part of the skin is still connected with the respiratory centre, for instance, after section of the spinal cord in the cervical region.

Notwithstanding the excessive frequency of the movements during panting, the respiration is in reality not more efficient than ordinarily, on account of the shallowness of breathing. In some experiments which I have never published, I learned that the heat dyspnœa gives way at once to the much more vigorous though slower movements of true dyspnœa on closing the trachea of the animal, to return when the breathing was no longer impeded. On the other hand, the condition of apnœa can readily be induced during panting. On connecting the trachea with the bellows and ventilating the lungs thoroughly, I found that the animal remained motionless even in the hot chamber. The apnœa was of the usual duration, but was followed at once by the breathing characteristic of heat dyspnœa. We are to conclude, hence, that even in heat dyspnœa the condition of the blood is the ruling factor, regulating the energy of the respiratory centre.

* *Journal of Physiology*, vol. ii, No. 3, p. 191 ; vol. iii, No. 1, p. 1.

NERVE-STRETCHING.

SELECT TOPICS OF MODERN SURGERY,* ILLUSTRATED BY CASES
FROM THE HOSPITAL SERVICE AND PRIVATE
PRACTICE OF

DRS. CHRISTIAN FENGER AND E. W. LEE, OF CHICAGO.

THIS operation has been known for only about half a decade. It was originated accidentally by Billroth, who cut down upon the sciatic nerve, expecting to find a tumor, but found nothing but normal nerve-tissue. By this very examination, however, the neuralgia was relieved. Nerve-stretching as a premeditated surgical operation was first carried out by Von Nussbaum, in Munich.

The unexpected success in relieving pain by this operative procedure in cases in which all other remedies have failed, and the almost absolute immunity, not only from danger to the patient's life, but also from the destruction or impairment of the normal functions of the nerve operated upon, caused this operation to be very readily adopted by medical men all over the world.

There are already a number of facts at our disposal which throw considerable light upon the therapeutic value of the operation in certain diseases of the nerves.

As our knowledge of the subject is as yet very imperfect,

*This is the general heading of a series of articles published in different American journals, and is kept up as such, because it is the intention of the authors, after a certain length of time, and after revision, correction, and addition, to publish the series in one volume.

owing to the scarcity of pathologico-physiological experiments on animals, we shall here give only a brief account of the various nervous diseases in which nerve-stretching has been tried, and point out the results, as far as known, but shall not be able to state anything about either the pathologico-anatomical or the pathologico-physiological side of the question.

From a merely clinical point of view, the different nervous diseases in which nerve-stretching has been tried are the following:

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| | $\left\{ \begin{array}{l} 1. \text{ Sciatica. } \left\{ \begin{array}{l} a. \text{ Rheumatic, idiopathic or primary.} \\ b. \text{ Symptomatic or secondary.} \end{array} \right. \\ 2. \text{ Prosopalgia. } \text{ Neuralgia of the fifth pair.} \\ 3. \text{ Intercostal neuralgia.} \\ 4. \text{ Idiopathic neuralgias of other nerves.} \\ 5. \text{ Neuralgias of the peripheral nerves caused by surgical lesions involving the nerve-trunks.} \end{array} \right.$ |
| I. Neuralgic Anomalies. | |
| II. Spastic Anomalies. | |
| III. Epilepsy. | |
| IV. Paralysis. | |
| V. Tetanus. | $\left\{ \begin{array}{l} 1. \text{ Mimic spasm. } \text{ Spasms of the seventh pair.} \\ 2. \text{ Spasms of the accessory nerve of Willis.} \\ 3. \text{ Spastic contractions of the nerves of the extremities.} \end{array} \right.$ |
| VI. Locomotor Ataxia. | |
| VII. Anæsthetic Leprosy. | |

I. NEURALGIC ANOMALIES.

I.—SCIATICA.

a. Rheumatic, Idiopathic or Primary Sciatica.

We have had at our disposal reports of ten cases of nerve-stretching in this disease, eight of which were successful and two unsuccessful (Bernays).

CASE 1.—(John Cheyne, Edinburgh, 1877.^{1 2}) A furnace-man, forty years of age, suffered for five years from pain and weakness in the right leg, which increased to such an extent that he became unable to walk. On April 19, 1877, the sciatic nerve was stretched. The nerve appeared perfectly normal. The operation was followed by perfect recovery.

CASE 2.—(John Cheyne, Edinburgh, 1877.^{1 2}) A furnace-man, forty-one years of age, had suffered from sciatica of the left side for ten months. The sciatic nerve was exposed and stretched April 23, 1877. The nerve appeared to have undergone fatty degeneration, and large, tortuous veins were to be seen on its surface. The pain disappeared entirely, with the exception of a

small place behind the great trochanter, where pressure still caused a little pain.

CASE 3.—(Maag, Denmark, 1878.³) A girl, nineteen years old, suffered from sciatica of three months' standing. The nerve was stretched. The wound did not heal by first intention. Recovery.

CASE 4.—(Patruban, Vienna, 1878.⁴) Sciatica. Stretching of the sciatic nerve, followed by great amelioration of the symptoms.

CASE 5.—(Bernays, St. Louis, Missouri, 1878.⁵) A man had suffered for six or eight months from severe neuralgic pains on the outer aspect of the thigh. The sciatic nerve was stretched immediately above the knee. The pain was relieved for six days, but then returned. One and one-half inches of the peroneal and external saphenous nerves were excised. This operation was followed by entire relief of the pain, but the muscles remained paralyzed.

CASE 6.—Dr. Bernays mentions another case, without giving particulars, in which nerve-stretching proved to be a complete failure.

CASE 7.—(Hildebrandt, Neustadt-Magdeburg, 1880.⁶) A woman, thirty-two years of age, suffered from sciatica of the left side. The sciatic nerve was stretched in the popliteal space. The wound healed by first intention. The operation was followed by immediate relief, and the patient, after eight days, was able to do her own work.

CASE 8.—(Esmarch, Kiel, 1880.⁷) Sciatica. Nerve-stretching. Recovery.

CASE 9.—(Purdie, London, 1880.⁸) Severe sciatica of several months' standing, in a miner. The sciatic nerve was stretched. The wound healed by first intention. Recovery.

CASE 10.—(Fenger, Chicago, 1880.) SYNOPSIS.—*Sciatica of one year's standing—Stretching of sciatic nerve between the great trochanter and the tuber ischii—Wound healed by suppuration in eight weeks—Cessation of pain in the leg—Temporary paralysis of the sphincter ani and anæsthesia of anal region and posterior surface of both thighs—Recovery.* Mrs. H., thirty-five years of age, healthy, stout, has two healthy children, aged, respectively, seventeen and eighteen years. Her father suffered from sciatica of the left side at the age of forty-five, which lasted a year, confining him to his bed for six months, and finally disappeared after treatment by sea-baths. Her sister had sciatica at the age of thirty. Her father died of cancer of the liver, at the age of fifty.

Her mother is still living, and healthy, with the exception of occasionally recurring muscular rheumatism.

In June, 1879, while crossing the Atlantic, Mrs. H. was seized with pain in the right side of the head, face, and neck, and in the right arm. An ointment was applied, and the pain disappeared in two or three weeks.

November, 1879.—The patient awoke one night with a sudden and violent pain in the right ankle, which she could trace to no inducing cause. She was obliged to keep her bed for eight days. Under the use of morphine and some ointment, the pain lessened so that she was able to be up and around.

During the whole of the following winter she was able to walk the whole day long on level ground without pain, but when mounting stairs, pain would set in, always at the same place, around the external malleolus, at which, however, no swelling nor other inflammatory symptoms were to be seen. Every night she would be awakened several times by vehement pain in the ankle, caused, as she thinks, by moving the leg during sleep. In this way it went on until June, 1880, when pain set in in the right knee and soon extended along the posterior part of the femur to the hip, so that she was not able to extend the leg at the knee, and could not walk without limping. When she got out of bed in the morning the pain was very severe, but would lessen after she had walked around a little. She would soon become tired and be obliged to sit down, and when she would start to walk again the pain would be very severe. She was not able to walk more than about two thousand feet before the pain would become so intense as to compel her to sit down. Various kinds of internal medication, hypodermic injections of morphine, and Turkish baths were tried, but with no effect. The pain became worse and she had more and more difficulty in walking, until she finally determined to have the proposed operation performed.

On October 6, 1880, Dr. Fenger, assisted by Drs. Jacobson and Koren, proceeded to stretch the right sciatic nerve. The patient was anæsthetized with chloroform. An incision was made, four inches in length, between the great trochanter and the *tuber ischiæ*. The layer of adipose tissue was about one inch in thickness. The depth of the wound and the hemorrhage caused a little delay in finding the trunk of the nerve, which, when found, appeared normal. The nerve was now stretched vigorously, centrally as well as peripherally, and pressed between the fingers and the instrument with which the nerve was held out of the wound, namely,

an elevator of the palpebræ used as a retractor. The wound was washed out with two and one-half per cent. solution of carbolic acid, until the hemorrhage ceased. No drainage tube was inserted. The wound was closed with antisepticized silk and Lister dressing applied.

The wound did not heal by first intention, but suppuration set in, which prevented it from healing for eight weeks, during which time the patient was obliged to remain in bed.

The pain in the thigh and knee ceased entirely and has not since returned, and the knee could be fully extended without pain; but for seven weeks after the operation there were inter-current attacks of pain around the right malleolus, which were controlled by morphine, and after the above-named period ceased entirely.

Four weeks after the operation, when lifting herself upon the bed-pan, she experienced a sudden and vehement pain in the sacral region, and radiating down the posterior surfaces of both thighs. After two days this pain ceased, but complete anæsthesia around the sacrum, the nates, and rectum, and down the posterior surfaces of both limbs remained. Injections in the rectum would not be felt, and for four weeks the passages were involuntary. There was also a strong tendency to incontinence of urine.

Eight weeks after the operation the wound was healed, and the patient was able to get out of bed, but she had to use crutches for four weeks.

Sitting on a hard chair would cause severe pain in the sacral region, which would be relieved only by sitting upon an inflated rubber bed-pan.

The sacral region and nates were in no place tender on pressure, and the skin covering them was so completely anæsthetic that a hypodermic injection of morphine would not be felt at all.

After four weeks' exercise on crutches, during which time the right leg was somewhat weak, but otherwise painless, she became able to walk with a cane, which she was obliged to use for about two weeks. Slight œdema around the malleoli of the right leg would show itself evenings and disappear in the mornings.

Now, March 4, 1881, the patient is able to walk around the whole day, and has no pain whatever in the leg, even after walking two miles. When she gets tired after such a walk, she will sometimes feel a pricking sensation along the posterior side of the leg, and occasionally, in bad weather, slight pain in the ankle. When she sits more than two hours in a hard chair, she feels pain

in the sacral region. The usual sensation with the passages is not quite normal. No fæcal matter will pass involuntarily, but sometimes, when coughing, flatus will pass without her knowledge. There is incomplete anæsthesia along the external border of the foot and external malleolus, on the nates, and the upper part of the posterior surface of the right thigh. The sensibility of the remainder of the lower extremity is normal and the muscular strength natural.

In this rheumatic or idiopathic sciatica, nerve-stretching may be considered to have had good results, and so much the more, since the cases in which it has been resorted to have been obstinate, of from three months' to fifteen years' duration, and the operation has been, so to speak, the *ultimum refugium*, every other mode of treatment having, in most of the cases, been tried in vain before the operation was resorted to. The operation, furthermore, has been so far successful in this disease, that in eight of the cases the one operation was sufficient, and no renewal of the stretching was necessary.

The localities in which the nerve has been stretched for sciatica are: 1. The popliteal space, posterior to or above the knee joint (Bernays, Von Nussbaum, and Hildebrandt); or more commonly, 2. The *inscissura sciatica*, that is, the space between the great trochanter and *tuber ischii*, where the nerve comes down from beneath the *gluteus maximus*, is covered only by the skin, and rests upon the *quadratus femoris* muscle. The latter locality is by far the most convenient for the performance of the operation, partly because the trunk of the nerve is easily found, and partly because a comparatively unskilled operator may perform the operation without risk, as the vessels which accompany the nerve are insignificant in size. The operation in the *inscissura sciatica* has, moreover, the advantage that the nerve-trunk is stretched at a point not far distant from the nerve-centre. Langenbuch advises to stretch the nerves as near the centre

as possible, even if it is not known in what part of the nervous system the action is needed. This renders it more certain that all the nerve-fibres affected will be reached by the operation. In the operation in the popliteal space, there is some danger even for the skilled operator, as has been demonstrated in a case reported by Von Nussbaum, in which, although the operation had been performed without accident, hemorrhage set in two weeks later, caused by ulceration through the walls of the popliteal vein, produced by the pressure of the drainage tube.

As to the amount of force which should be employed to stretch the nerve effectively, it is in this, as in all cases of nerve-stretching, impossible to give specific rules for the guidance of the operator. From experiments on dead bodies we know that the average weight required to break the sciatic nerve asunder is one hundred and thirty pounds (Johnson, Lymington ⁹). On another occasion the sciatic nerve was thoroughly stretched by taking it out of the wound and lifting it so that the leg was also raised.

The advice most generally given, and probably the best, is to pull on the nerve-trunk successively, both in the peripheral and central directions, long and vigorously, until a sensation as of something giving way in the trunk of the nerve is experienced. Care must of course be taken to cease stretching when this sensation is experienced, so as to avoid a rupture of the nerve-trunk. The danger of rupture is, however, not very great, as no case is as yet on record. The same method may be pursued in the stretching of other nerves.

b. Symptomatic or Secondary Sciatica.

This disease is characterized by pain in the territory of the sciatic nerves, dependent upon or complicated with lesions of the spinal cord. In such cases, as might be

expected, nerve-stretching has not been as successful as in the former class. Out of seven cases only one complete recovery is reported (Andrews); in five cases greater or less complete relief followed the operation; and in one case (Czerny) no effect at all was experienced.

From another standpoint than that of cure of the disease, which in this affection is generally out of the question, it must be admitted that the operation has even here not been performed in vain, for by it the sufferings of the patients have been relieved in great measure. We consider that the good results obtained by this operation have been amply sufficient to compensate for the inconvenience to the patient, due to the operation itself.

CASE 1.—(E. Masing, St. Petersburg, 1878.¹⁰) A working man, thirty-seven years old, had suffered for eight years so severely from neuralgia in both extremities that he was about to commit suicide. For seven years he had been going from one hospital to another without obtaining relief. The muscles of both legs were atrophic; almost complete anæsthesia existed in the territory of the sciatic nerves of both sides; the muscles of the legs and feet were parietic; defecation was sometimes spontaneous, and micturition difficult. The sciatic nerves of both sides were stretched, under antiseptic precautions. Violent pain was experienced in the first week after the operation. During the second week the pain gradually diminished, and the anæsthesia and paresis lessened.

Two months later the left crural nerve was stretched on account of pain on the anterior side of the thigh. The final result was that the anæsthesia and pain entirely disappeared, and the paresis was ameliorated until there remained only slight disturbance of motion in the ankle joints and toes. The urinary trouble, however, continued.

CASE 2.—(E. Masing, St. Petersburg, 1878.¹⁰) A boy, ten years of age, after a fall on the sacral region, suffered from contractures of the muscles of the left leg, so that the foot was fixed in the position of *pes varus*. There was no active mobility whatever; passive movements caused pain; there was general hyperæsthesia of the skin of the foot and leg; tenderness on pressure

along the sciatic nerve. During sleep and narcosis the spastic contractures relaxed. All other means having been tried in vain, nerve-stretching was resorted to. Immediately after the operation the symptoms increased, and no amelioration set in for seven weeks, after which time the pain and spasms gradually diminished. Seven months afterward the patient's condition was a little better, but he still had pain and was unable to walk.

CASE 3.—(Edmund Andrews, Chicago, 1876.⁴) A sailor, who had fallen down a year previous to the operation and fractured two ribs and the right thigh, subsequent to this injury suffered from paresis and anæsthesia of both lower extremities. When brought into Mercy Hospital he complained of spastic contractions and severe pain when his legs were extended; the main symptom being constant tonic spasms of the *adducti* of both thighs, the contraction being caused, among other things, by touching the glans penis. In narcosis carried out even to complete anæsthesia of the cornea, extension of the lower extremities would cause these spasms to set in. On May 15, 1876, the left sciatic and crural nerves were stretched. After the operation the symptoms on the right side ceased, and when on May 24, 1876, the same operation had been performed on the right side, the spasms of the left leg ceased. The cure was perfect seven months after the second operation, so far as known; so far perfect, at least, as to enable the patient to perform a sailor's duties on his passage from America to England.

CASE 4.—(Czerny, 1879.¹¹) Neuralgia in the sciatic nerves of both sides from myelitis, caused by compression, in a case of Pott's disease of the vertebral column. The sciatic nerves were stretched with no perceptible result.

CASE 5.—(Trendelenburg, Rostock, 1880.⁷) Sciatica consequent upon spinal injury. The sciatic nerve was stretched with incomplete effect.

CASE 6.—(Fenger, Chicago, 1880.) SYNOPSIS.—*Severe sciatic pain of four months' standing, in a case supposed to be central cancer of the bones of the pelvis—Stretching of the sciatic nerve—Cessation of the pain—Progressing cachexia and debility—Death.* Miss Fogarty, unmarried, forty-five years of age, came under the care of Dr. Fenger December 10, 1880. Family history good. She had had no severe illness previously, but had always been rather lean and nervous. Four months previous she was seized with what she believed to be rheumatic pains at the external and posterior side of the left hip, and from there radiating upward along the right half of the sacrum to the lumbar region, and downward

along the posterior side of the thigh to the knee joint. The pain, at first slight, made it difficult for her to walk, and two months later she was obliged to go around on crutches, as the pain became unbearable when the limb touched the ground.

Many kinds of internal and external treatment were tried by different physicians, but the pain steadily increased, and paroxysms set in even when she was sitting or lying down, so that she was not able to sleep at night, and the pain could not be controlled even by large doses of morphine. During these four months her appetite was poor, and she decreased considerably in weight.

On examination, December 10th, the patient was lying on an adjustable folding chair, the left leg slightly flexed on the hip-joint, and resting on pillows. The slightest movement from this position would cause intense pain. Pressure upon the great trochanter would also cause pain, as well as pressure anterior to the joint. No swelling around the hip. The patient was considerably emaciated. Pulse and temperature normal. Lungs, heart, and abdominal organs normal. The urine contained neither albumen nor sugar. The bowels were habitually constipated. There were no signs of paresis or anæsthesia in any part of the lower extremities.

As the pain was mainly localized around the hip-joint, and the patient would submit neither to an operation nor to an examination in narcosis, extension by means of a weight and pulley was tried, to relieve the pain in the hip. For about a week it seemed as if this treatment would relieve the pain, as the patient was able to rest in bed night and day, and suffered much less at night, but in the second week severe paroxysms of pain set in, just as before the extension, and could not be controlled by hypnotics of any kind. She then consented to have an examination made in narcosis, and then, if the hip-joint was found healthy, to have nerve-stretching performed at the same time. Consequently, preparations were made, and on January 6, 1881, Dr. Fenger, assisted by Dr. Dudley, performed the operation.

The patient was anæsthetized with ether; the hip-joint was found perfectly movable; the sciatic nerve was cut down upon between the great trochanter and the *tuber ischiï*, taken out without difficulty, stretched vigorously both in the central and peripheral directions, and, after having been compressed and rolled between the finger and the retractor with which it was lifted from the wound, it was replaced, a drainage tube inserted, the wound united with aseptic silk, and Lister dressing applied.

The spontaneous pain in the legs disappeared entirely from the time of the operation, so that the patient could rest in bed and sleep all night long, but active and passive movements of the lower extremity would still cause pain on the posterior side of the hip and in the lumbar region. For three days after the operation there was incessant vomiting, which afterward disappeared. Pulse and temperature were always normal. Four days after the operation the drainage tubes and sutures were removed. Eight days after the operation the Lister dressing was removed, and the wound healed by first intention. In the course of the following four weeks the patient wasted gradually; the appetite, previously poor, disappeared entirely; in the meantime the pulse and temperature continued normal. She would sleep at night and part of the day, without hypnotics, and never complained of any pain except when moved to have a passage of the bowels or an injection. In the second week of February she became somnolent, apathetic, no rise in temperature occurring at any time, and died February 12th. An autopsy was not permitted.

CASE 7.—(Fenger, Chicago, 1880.) SYNOPSIS.—*Severe pains in region of left sciatic nerve, in a case of obscure, central nervous disease—Nerve-stretching—Healing by first intention—Cessation of pain—Progress of the original disease—Death.* P. N., an Irishman, about sixty years of age, was transferred August 5, 1880, from the medical to the surgical side of Cook County Hospital, and put under Dr. Fenger's care, with a view to the performance of nerve-stretching for supposed sciatica. The patient was greatly emaciated, and absent-minded or idiotic, so that he was not able to give any history of his case. He complained of severe pain on the posterior side of the left hip-joint, radiating from this point down the posterior side of the thigh. This pain set in in frequent paroxysms, and did not allow him to sleep at night. The pulse and temperature were normal; the heart, lungs, and abdominal organs normal; urine normal. His mental condition was one of stupor. He would sometimes pass urine and fæces involuntarily in bed, and his appetite was poor.

August 7, 1880.—Dr. Fenger stretched the left sciatic nerve in the manner described above. No drainage tube was inserted. The wound was united by aseptic silk and Lister dressing applied. The wound healed by first intention in eight days. The spontaneous paroxysms of pain ceased, but the patient wasted away gradually, and died four weeks later, without any notable change in the symptoms. An autopsy was not permitted.

2.—PROSOPALGIA, OR NEURALGIA OF THE FIFTH PAIR.

The branches of the fifth pair, operated upon in the recorded cases, have been the supra-orbital and infra-orbital of both sides in one case; supra-orbital and infra-orbital of one side, two cases; infra-orbital and mental of one side, one case; supra-orbital, four cases; infra-orbital, three cases; and inferior dental, one case.

Complete relief was experienced in nine cases, partial relief in one case, and no effect in two cases. In the case in which partial relief was experienced, the pain returned a few weeks after the operation. In two of the cured cases, temporary painful sensations were felt; in one case immediately, and in another twice during the first year, after the operation. In three cases nerve-stretching was combined with excision. In one case, after nerve-stretching had been performed with no effect, the nerve was divided and relief followed. The duration of the disease varied from seven months to ten, and in one case to fourteen years. Sensibility returned in the territory of the nerve operated upon, almost immediately in two cases, after two months in one case, and after five months in one case.

CASE 1.—(Vogt, 1876.⁴) Stretching of inferior dental nerve for neuralgia, followed by recovery.

CASE 2.—(Crofft, London, 1877.¹³) Convulsive neuralgia in the territory of the infra-orbital nerve. Five-eighths of an inch of the nerve was excised, and the nerve stretched. During the first year after the operation, two light attacks of the neuralgia were experienced. After that time the recovery was complete.

CASE 3.—(Charles Higgins, 1879.¹⁴) The patient was a man, 62 years of age, who suffered from neuralgia of the left supra-orbital and infra-orbital nerves subsequent to extirpation of the eye. These nerves were stretched. The operation resulted in perfect recovery, and sensibility soon returned.

CASE 4.—(Higgins, 1879.¹⁴) A man, 53 years of age, suffered from neuralgia of the right supra-orbital nerve after extirpation of the eye. The nerve was stretched, with the result of permanent relief from the pain, and a speedy return of sensibility.

CASE 5.—(Kocher, Berne, 1879.¹⁵) A cigarmaker, 32 years of age, had suffered for fourteen years from neuralgia of the right supra-orbital nerve. Nerve-stretching was performed, resulting in immediate recovery and the return of sensibility in two months.

CASE 6.—(T. Grainger Stewart, 1879.¹⁶) A man, 70 years old, suffered from neuralgia of the second branch of the left trigeminal nerve, combined with clonic spasms in the facial muscles of the same side. The left infra-orbital nerve was stretched with no effect. The same nerve was afterward divided, but no relief from pain was experienced. Finally, the left mental nerve was stretched, and the pain and spasms were permanently relieved.

CASE 7.—(Czerny, 1879.¹¹) Neuralgia of the supra-orbital and frontal nerves. The nerves were stretched without effect. Two weeks later resection was performed, followed by the use of electricity. This treatment resulted in complete relief.

CASE 8.—(Masing, St. Petersburg, 1879.¹⁷) A lady, 60 years of age, had suffered from severe supra-orbital neuralgia for about three years. The supra-orbital nerve was stretched, and the patient recovered. For one week after the operation chemosis and diffuse superficial keratitis were noticed, and anæsthesia of the forehead and cornea continued for eight months.

CASE 9.—(Hahn, Berlin, 1880.⁷) In a case of supra-orbital and infra-orbital neuralgia nerve-stretching was resorted to with no effect.

CASE 10.—(Purdie, London, 1880.⁸) The patient had suffered for years from epileptiform neuralgia of the second branch of the fifth pair. A transverse incision was made, and the infra-orbital nerve stretched by means of a blunt hook. This operation was followed by relapse. After five days the nerve was again stretched, and complete relief resulted.

CASE 11.—(Von Nussbaum, Munich, 1880.) Neuralgia of the supra-orbital and infra-orbital nerves of both sides. Nerve-stretching and excision of the nerves affected were performed. Relief for a few weeks followed the operation, but the patient soon suffered relapse on the left side.

CASE 12.—(Walsham, 1881.¹⁷) A woman had suffered for more than ten years from severe pain in the territory of the infra-orbital nerve. The nerve was stretched at its point of exit from the infra-orbital foramen. The operation was followed by erysipelas, in the course of which two slight attacks of pain were experienced; after this the patient's recovery was complete. Five months after the operation no relapse had occurred.

3.—INTERCOSTAL NEURALGIA.

CASE 1.—(Von Nussbaum, Munich, 1878.^{7,18}) A man, 20 years old, suffered from severe neuralgia on both sides, extending from the sternum to the umbilicus. Incisions were made, on both sides, along the external border of the *rectus abdominis* muscle, and the eighth, ninth, and tenth intercostal nerves exposed and stretched. Temporary relief was experienced. A relapse followed, and no further history of the case is reported.

4.—IDIOPATHIC NEURALGIAS OF OTHER NERVES.

Five cases of nerve-stretching in this class of diseases have been recorded, two of which resulted in complete recovery, while in three cases the relief obtained was only partial.

CASES 1, 2, and 3.—(Langenbuch, Berlin, 1880.⁷) Brachial neuralgia. The brachial plexus was stretched, with, in each case, only partial relief.

CASE 4.—(Hildebrandt, Neustadt-Magdeburg, 1880.⁶) A man, 32 years of age, complained first of stiffness of the fingers of the right hand; later, of pain along the inner surface of the forearm, which afterward extended up the arm and right side of the neck. The brachial plexus was stretched, and the patient obtained immediate and permanent relief.

CASE 5.—(Schüssler, 1880.¹⁹) A lady, 53 years of age, had suffered for three years from severe neuralgia in the right half of the occipital region. The trunk of the occipitalis major nerve was laid open, from the place where it passes through the trapezius muscle up to the *spina occipitalis externa*. The sheath of the nerve was thickened and injected. The nerve was then taken out from the sheath, taken between two fingers, and stretched vigorously in both directions. The wound was closed, and antiseptic dressing applied. A few slight attacks of pain occurred during the first three days, after that time the recovery was complete. The wound healed by first intention.

5.—NEURALGIAS OF THE PERIPHERAL NERVES CAUSED BY SURGICAL LESIONS INVOLVING THE NERVE-TRUNKS.

This class of neuralgias is represented by eleven detailed cases, of which eight were cured, two improved, and one a

failure. In one case it was necessary to stretch the nerve a second time before relief was secured. The nerves stretched were the following: Brachial plexus, one case; recovery. The median nerve, three cases; two recoveries and one partial relief. The ulnar nerve, two cases; one complete and one partial recovery. The sciatic nerve, two cases; two recoveries. The digital nerve, one case; recovery. The peroneal nerve, one case; recovery. Nerves of the testicle, one case; no effect.

Besides the eleven cases reported here, it must be mentioned that Esmarch has performed nerve-stretching several times (the exact number is not given) in cases of neuralgia following amputation, namely, in painful amputation-stumps, with invariable success. It seems, therefore, possible that in these obstinate cases nerve-stretching may supplant the former treatment of excision of the scar of the stump, or re-amputation.

It has been ascertained that the radial nerve of an adult requires an average weight of 84 pounds to break it asunder.

CASE 1.—(Callender, London, 1875.⁸) Neuralgia in the territory of the median nerve, of one year's duration, subsequent to amputation of the hand on account of injury by a circular saw. The median nerve was stretched, and the patient obtained permanent relief.

CASE 2.—(Maag, Denmark, 1878.³) A girl, 23 years of age, suffered from pain in the region of the sciatic nerve, of eighteen months' duration, subsequent to an abscess of the thigh. The sciatic nerve was stretched; the wound did not heal by first intention. Recovery.

CASE 3.—(Maag, Denmark, 1878.⁴) Intermittent neuralgia and contracture of the thumb and forefinger of the right hand, subsequent to a punctured wound of the hand. The median nerve was stretched in the *sulcus bicipitis*, and the patient recovered.

CASE 4.—(Vogt, 1878.⁴) Neuralgia after wound on the inner side of the right forearm, involving the ulnar nerve. The incision was made in the scar, and the ulnar nerve dissected out and

stretched. The operation was followed by immediate and permanent relief.

CASE 5.—(Czerny, 1879.¹¹) Neuralgia subsequent to suppuration around elbow joint. The ulnar nerve was stretched in the axillary plexus. The patient's condition was ameliorated, but the recovery was not perfect.

CASE 6.—Estlander, 1879.²¹) After a bullet wound through the arm the patient suffered from neuralgia in the territory of the median nerve. The nerve was stretched, and the pain ceased for 24 hours. This was followed by a relapse for three weeks. After this time the pain gradually decreased, but the recovery was not perfect.

CASE 7.—(Küster, Berlin, 1880.⁷) Sciatica consequent upon bullet wound. The sciatic nerve was stretched without effect. Nerve-stretching was repeated, followed by recovery.

CASE 8.—(Purdie, London, 1880.⁸) Neuralgic pain in the index finger subsequent to suppuration under the nail. The digital nerves were stretched; the pain ceased and has not returned.

CASE 9.—(Esmarch, Kiel, 1880.⁷) The peroneal nerve was stretched on account of neuralgia. The operation was followed by recovery.

CASE 10.—(Esmarch, Kiel, 1880.⁷) Neuralgia of the testicle after castration. The external spermatic nerve was stretched, but the operation gave no relief to the pain.

CASE 11.—(Crédé, 1880.²²) Ascending neuritis in the territory supplied by the left radial nerve, following traumatic injury. The radial, median, ulnar, and cutaneous axillary nerves were stretched, and the pain, which had been intense for eighteen months, was immediately and permanently relieved.

II.—SPASTIC ANOMALIES.

I.—MIMIC SPASM. SPASMS OF THE SEVENTH PAIR.

The five cases of mimic spasm on record were all cured by nerve-stretching. The disease was of from two to eight years' standing. The paralysis following the operation lasted, in the four cases in which it was reported, respectively two weeks, eight weeks, two months, and five months. In one case the nerve was stretched anterior to the ear, below the zygomatic arch. In the other cases a more central incision was made, that is, below or behind the ear.

CASE 1.—(Baum, Danzig, 1878.²³) A woman, 35 years old, suffered from spasms in the muscles of the left side of the face, subsequent to epileptiform attacks. An incision was made, anterior to the ear, and the seventh nerve stretched. The operation was followed by paralysis for two weeks, after which time the recovery was perfect.

CASE 2.—(Schüssler, Bremen, 1879.²⁴) A lady, 39 years of age, had suffered for eight years from spasms in the left half of the face and soft palate. The trunk and descending branch of the seventh nerve were vigorously stretched. The relief was instantaneous; a slight paralysis continued for eight weeks. Two months after, there had been no relapse.

CASE 3.—(Allan Sturge and Mr. Godlee, London, 1881.¹²) A lady had suffered from mimic spasm for over five years. The seventh nerve was stretched below the ear. The operation was followed by paralysis which continued two months. After that time the recovery was complete.

CASE 4.—(Eulenberg, Berlin, 1881.¹²) Nerve-stretching was performed in a case of mimic spasm. Paralysis for five months and complete recovery were the results of the operation.

CASE 5.—Dr. Putnam (Boston, Massachusetts, 1881.¹²) reports one case of mimic spasm in which nerve-stretching was performed and recovery followed.

2.—SPASMS IN THE TERRITORY OF THE ACCESSORY NERVE OF WILLIS; THAT IS, SPASMODIC TORTICOLLIS.

Six cases of nerve-stretching in this disease are recorded, only one of which was cured by the nerve-stretching alone. In one case nerve-stretching gave only partial relief, and in two cases it was of no effect. In one of these latter cases the relief was subsequently obtained by excision. In two cases nerve-stretching combined with excision resulted in cure. In one of the last-named cases a return of the spasms occurred for about fifteen minutes, and in the other slight spasms of about one month's duration followed the operation. The disease had persisted from six to eighteen months. The incision was made and the nerve stretched, in each case, at the upper part of the posterior border of the sterno-cleido-mastoid muscle.

From the following cases we conclude that nerve-stretching in this disease is not so efficacious as in mimic spasm, and it seems to be advisable to combine nerve-stretching with excision, as was done in the two cases reported by Hansen.

CASE 1.—(Tage Hansen, Denmark, 1878.²⁵) A woman, thirty-one years of age, had suffered for six months from spasmodic torticollis. The nerve was cut down upon at the upper part of the posterior border of the sterno-cleido-mastoid muscle, and vigorously stretched, and a piece of the nerve, twelve millimetres in length, excised. When the patient awoke from the narcosis, the spasms returned for a quarter of an hour, then ceased, and have not returned.

CASE 2.—(Tage Hansen, Denmark, 1878.²⁵) A woman, thirty years of age, had suffered for one and a half years from spasmodic torticollis. Nerve-stretching was resorted to, and fifteen millimetres in length excised. Slight spasms continued for a month. After this time the recovery was complete.

CASE 3.—(Annandale, 1879.²⁶) A girl, twenty-four years of age, suffered from torticollis, the head being drawn to the left so as to look over the shoulder. When an attempt was made to turn the head to its normal position severe clonic spasms set in. The spinal accessory nerves of the left side were stretched. This operation gave no relief. The nerves were then divided, and immediate relief followed. One year after the operation the mobility was normal and the patient suffered no pain.

CASES 4 and 5.—D. E. Morgan (1879²⁶) reports two cases of spasmodic torticollis, one of which was cured by nerve-stretching. In the other no effect was produced.

CASE 6.—Küster (Berlin, 1880⁷) reports a case of clonic spasms in the muscles supplied by the spinal accessory nerve. The nerve was stretched, but the operation gave only partial relief.

3.—SPASTIC CONTRACTIONS OF THE NERVES OF THE EXTREMITIES.

To the three cases of this disease here recorded might be added the case of Dr. E. Andrews, of Chicago, already mentioned. The case is remarkable as being the only one

in which not only the spasms but also the contracture ceased, and complete cure was effected. Improvement was produced by nerve-stretching in the other three cases: in two of them the tonic spasms diminished, and in the third the spastic cramps ceased, but the contracture remained.

CASE 1.—(Von Nussbaum, Munich, June 23, 1872.⁴) Spastic contraction of the left pectoralis major and minor, flexors of the left arm, forearm, and hand, subsequent to bullet wounds of the elbow and neck. Nerve-stretching was performed, the following nerves being included in the operation: the ulnar nerve at the border of the biceps, the nerve-trunks around the axillary artery, and the inferior cervical nerves in the outer part of the supraclavicular region. The patient's condition was greatly ameliorated by the operation.

CASE 2.—(Von Nussbaum, Munich, 1876.⁴) Tonic spasms in the lower extremity, of eleven years' duration, in a case of paraplegia, subsequent to an injury in the sacral region. The sciatic and crural nerves of one side were stretched, and two weeks later the same nerves of the other side. The patient's condition was much improved by the operation; so much so that he was able to walk with the aid of crutches.

CASE 3.—(Czerny, 1879.¹¹) A student had suffered from birth from hemiplegic contracture with spastic cramps in the right arm, supposed to have been caused by pressure from the forceps during delivery. The axillary plexus was stretched in the axilla, and, later, the supraclavicular plexus. The painful spasms ceased, but the contracture remained.

III.—EPILEPSY.

It is hardly necessary to state that it is only in those cases of epilepsy with an aura from the territory of a peripheral nerve that nerve-stretching can be of use. We have found records of only three cases, with recovery in one, alleviation of the paroxysms in one, and no effect in the other.

CASE 1.—(Von Nussbaum, Munich, 1875.⁴) Reflex epilepsy from leg. The tibial and peroneal nerves were stretched. Perfect recovery.

CASE 2.—(Czerny, 1879.¹²) Epilepsy with aura from ulnar nerve. No decided effect was noticeable. Bromide of potassium was now given, which gave relief.

CASE 3.—(Gillette, Paris, 1881.²⁸) Congenital epilepsy. The median and cubital nerves were stretched at the upper third of the arm. About ninety paroxysms had occurred during the month prior to the operation. In the month succeeding the nerve-stretching only eighteen spasms occurred. The paroxysms diminished not only in frequency, but also in intensity and duration. The greater part of the attacks were merely vertiginous, continuing from two to five minutes. The aura completely disappeared. The wound healed by first intention. The patient experienced a little numbness in the area of the cubital nerve, which disappeared a week after the operation.

IV.—PARALYSIS.

CASE 1.—(Von Muralt, 1880.²⁷) A boy suffered from paralysis of the extensor muscles of the arm, subsequent to a fracture of the humerus which had healed in a bad position. The radial nerve was stretched, and complete recovery from the paralysis followed.

V.—TETANUS.

Of twenty-one cases of traumatic tetanus treated by nerve-stretching, nine recoveries and twelve deaths are reported. It would be a great mistake, however, to conclude that the death-rate in traumatic tetanus had been so diminished by nerve-stretching as to reduce it from the usual eighty or ninety to about forty per cent. The reason for this apparent decrease is that all the successful cases have, of course, been reported, but a number of the unsuccessful ones have not. In the discussion on nerve-stretching at the Congress of German Surgeons in Berlin, in 1880, Schede, Hahn, and Sonnenberg stated that they had performed nerve-stretching in tetanus with no effect.⁷ How many unsuccessful cases this statement is intended to include, we do not know.

The nerves stretched were always the nerves of the ex-

tremities. It is difficult to state the exact value of the operation in those cases which recovered, as presumably in all cases some medicine had, in addition, been given. This question will probably never be solved, because no physician would be justified in risking the life of his patient in this terrible disease, by omitting any of the therapeutic remedies at his disposal. We do not, however, consider it just, as some others have done and will do, to deny that nerve-stretching has had any success at all in tetanus, and we think that Morris is not exactly right in his opinion, that the cases in which nerve-stretching has proved successful consist only of those subacute and mild cases of traumatic tetanus in which internal treatment alone would have effected a cure.

First, as to the absolute denial that nerve-stretching has been productive of any good results. It will be seen from the cases recorded, that in severe and even in finally fatal cases there has been a marked, although only temporary effect: namely, the paroxysms have ceased, and the patient has experienced relief for from twelve hours to three days before a fatal relapse set in.

Second, as to Morris' statement that only the subacute and mild cases have been cured by nerve-stretching. We agree with him to this extent, that none of the cases in which recovery has taken place have been cases of *tetanus acutissima*. But when the question of severity is brought up, it is our opinion that the case reported by D'Ollier, which was attended with opisthotonos, difficulty in swallowing, and tetanic contractions of the muscles of the abdomen and lower extremities, can certainly not be counted among the mild forms of the disease.

Further, as to the danger from traumatic tetanus, the statistics of Taylor from Guy's Hospital²⁹ have shown the following connection between the interval from the receipt

of the injury and the first symptoms of tetanus, and the death-rate :

In the cases in which tetanus set in within one week after the receipt of the injury, the death-rate was 87.5 per cent.; when the interval was from one to two weeks, the death-rate was 88 per cent.; and with an interval of from two to three weeks, the rate of mortality decreased to 57.2 per cent. Consequently, we see that those cases in which the tetanus appeared within two weeks after the receipt of the injury are the more dangerous.

Amongst the cases of recovery after nerve-stretching we find one interval of seventeen days, one of fourteen, one of eight, one of seven, and one of four. Three of these cases, therefore, as far as the importance of the intervals goes, belonged to the dangerous class of cases.

We willingly admit that the amount of material at our disposal does not enable us to form a decided opinion about the value of the operation as a curative method in tetanus, but we consider it as unquestionably proved that some beneficial effect has been derived from nerve-stretching in this disease.

It seems to us, as a natural and necessary consequence of this, that the operation is imperative in each and every case in which there is any possibility of getting at the nerve-trunks, through which the primary impulse of this terrible disease is conveyed to the central nervous system ; and this so much the more as nerve-stretching is an innocent and non-mutilating surgical procedure compared with, for instance, amputation, which has been so often tried in vain that it has been abandoned, not because of the loss of the limb, which would be submitted to gladly, but because of its utter want of efficacy in checking the progress of the disease.

A question as yet entirely open is this: Would not

division or section of the nerves be more successful in certain cases than nerve-stretching? Morris expresses this opinion. In one of our own cases where the axillary plexus above the clavicle had been stretched with no effect, a subsequent division of these nerves caused the very violent and frequent tetanic spasms to cease for twenty-four hours in a severe and finally fatal case of tetanus.

It seems to us that it would be worth while, in these cases, either to combine division of the nerves with the nerve-stretching, or to perform division when nerve-stretching has been performed in vain. Nothing is lost in following either of these two plans; as, first, the ends of the divided nerve will grow together again in a few weeks; and, second, reopening of the wound under antiseptic precautions will not be prejudicial to the healing of the wound by first intention.

CASE 1.—(Paul Vogt, 1876.³⁰) A laborer, 63 years old, two weeks after receiving a wound in the palm of the right hand, which had healed, was seized with trismus, severe opisthotonos, and severe clonic convulsions. There was no tenderness in the cicatrices nor along the course of the nerves in the arm and forearm, but pain was experienced on pressure on the brachial plexus and neck. The brachial plexus of the right side was stretched above the clavicle. The cicatrices in the hand were also excised. Immediate relief of the symptoms was experienced, and recovery followed. Opium was the only medicine employed.

CASES 2, 3, and 4.—Vogt (1876⁴) reports three cases of nerve-stretching in tetanus, two of which were perfectly successful. In the third case the patient died.

CASE 5.—Verneuil (1876³²) reports a case of stretching of the ulnar and median nerves in tetanus with recovery.

CASE 6.—(Drake, 1876.^{31, 32}) A man, 28 years of age, was seized with severe tetanus from a slight injury of the left foot. The sciatic nerve was stretched and calabar bean administered. The convulsions ceased for about twelve hours, then recurred in a mild form for three days, after which time they increased in severity, and the patient died on the twelfth day after the operation.

CASE 7.—(Ransohoff, Cincinnati, 1879.³²) A boy, 13 years of

age, wounded the left foot by stepping upon a piece of rusty iron. The wound healed quickly. Eight days after the injury, trismus and tetanus set in. The cicatrix was excised, and hydrate of chloral and calabar bean administered, but without effect.

On the fourth day after the tetanus set in, an incision was made behind the internal malleolus, and the posterior tibial nerve stretched. The convulsions in the injured limb ceased immediately after the operation. There was a gradual decrease in the severity of the symptoms, and in three weeks the recovery was complete.

CASE 8.—(Hutchinson, London, 1879.³³) Injury to right leg by a wound from a shot-gun, followed by a high degree of acute tetanus. The right sciatic nerve was stretched with considerable force. After the operation the patient passed a quiet night. The next morning a relapse occurred, and twenty hours afterward the patient died during a convulsion.

CASE 9.—(Morris, London, 1879.³⁴) Ten days after a superficial injury of the right foot, in a boy 7 years of age, severe tetanus set in. The sciatic nerve was stretched. A severe convulsion occurred immediately after awaking from the narcosis, and the patient died six hours later.

CASE 10.—(H. G. Clark, 1879.³⁵) A female, 24 years of age, suffered disarticulation of the right hallux by a street-car accident. Seven days later, trismus, tetanus, and tenderness along the course of the anterior tibial nerve occurred. Four days later the right sciatic nerve was stretched. Immediately after awaking from the narcosis a convulsion occurred. Calabar bean was administered. The spasms ceased for twenty-four hours. The patient then relapsed. Calabar bean and morphine were given, and ice applied along the vertebral column. The patient recovered in six weeks. In the author's opinion, the course of the disease was not influenced by the operation.

CASE 11.—(Dr. Fenger, Chicago, 1880.)

SYNOPSIS.—*Crushing injury to the left forearm. Amputation at lower third of humerus. Tetanus after thirty-six hours. Stretching of axillary plexus above the clavicle. Little or no effect. Forty-eight hours later, reopening of wound and division of nerves of brachial plexus. Paroxysms of pain and opisthotonos entirely stopped for thirty-six hours. Relapse, and death after two days.*

I. B., a German laborer, fifty-five years of age, was brought to Cook County Hospital, Aug. 3, 1880, and placed in the care of Dr. Fenger. A few hours before, the left hand had been torn

completely off in a machine ; the ulna and radius were broken at about the middle ; to the hand was attached the skin of the forearm almost up to the elbow joint ; the tendons and muscles of the forearm were irregularly torn. This injury necessitated immediate amputation at the lower third of the humerus.

August 4th. The patient rested well during the night ; temperature and pulse normal. Some vomiting followed the administration of ether.

August 5th. Late last night paroxysms of pain in the amputation-wound set in, which were followed by trismus, contraction of the posterior muscles of the neck, opisthotonos. Sleep disturbed by the paroxysms. The patient can open his mouth only about half an inch. The posterior muscles of the neck are moderately stiff. He does not complain of any pain, except at the time of the paroxysms, which occur about every two hours and conclude in twitchings, that is, painful contractions of the muscles of the stump. As the disease was manifestly tetanus, and each paroxysm appeared to have its starting-point in the nerves of the amputated arm, Dr. Fenger resolved to try nerve-stretching of the brachial plexus.

The patient was anæsthetized. An incision six centimetres in length was made in the supraclavicular fossa, half an inch above, and parallel with, the upper border of the clavicle. The *platysma* was divided upon the guide, but after this the dissecting forceps alone was used in separating the tissues to reach the brachial plexus. The large nerve-trunks were drawn out of the wound separately by means of the blunt hook, stretched by traction both in the central and peripheral ends. These thick nerve-trunks were, furthermore, compressed between the thumb and index finger. They were then slipped into the wound ; a drainage tube inserted ; the wound closed and dressed antiseptically.

August 6th. Yesterday afternoon the paroxysms were fewer in number and less violent. The patient slept some during the night. He says that he feels better than before the operation, but on examination it was found that the lockjaw and stiffness of the muscles of the neck were the same as the day before. Calabar bean, morphia, and chloral were administered.

August 7th. The patient slept very little during the night on account of spasms in the arm and paroxysms of opisthotonos, which rapidly increased in violence and frequency, occurring every fifteen minutes. The patient looked haggard and anxious.

As the tetanus was evidently progressing toward a fatal ter-

mination, Dr. Fenger resolved to divide the nerves in the brachial plexus, thinking that as the paroxysms had their initial point in the nerves of the stump, division of the nerves might control them.

The patient was again anæsthetized. The wound, when reopened, was seen to be agglutinated by perfectly healthy-looking, coagulated plasma. The large nerve-trunks of the brachial plexus were easily found, taken out of the wound, divided with scissors, and then replaced, and the wound was closed and dressed antiseptically.

August 8th. The paroxysms of pain in the stump, and the opisthotonos have entirely ceased since the operation. The patient slept well during the night, feels much relieved, and talks hopefully. The muscles of the neck are less stiff, but the patient is still unable to open his mouth more than about half an inch. The internal treatment was continued. The amputation-wound was dressed, and no swelling nor suppuration found.

August 9th. The patient had a return of the paroxysms of opisthotonos last night, until they recurred with their former frequency. The convulsions increased during the night, so that they occurred every five minutes. The trismus is unchanged. The patient still takes a good deal of nourishment.

August 10th. Pulse, 130; temperature, 102.75°. The paroxysms are increasing in violence and frequency. They occur now every two or three minutes.

August 11th. Last evening the patient became delirious. After this the paroxysms stopped. Toward morning the breathing became difficult, the pulse weaker, and he died a little before nine o'clock this morning.

CASE 12.—(Dr. Fenger, Chicago, 1880.)

SYNOPSIS.—*Crushing injury to left elbow joint. Tetanus five days later. Amputation at the middle of the humerus, with vigorous stretching of all nerves in the amputation-wound. No effect on the tetanus. Twelve hours after the operation, death.*

Joe Chastrand, a painter, 29 years of age, entered Cook County Hospital, July 6, 1880, and was placed in my care. About nine o'clock in the morning, while painting at a distance of 55 feet from the ground, one of the hooks holding the flying-stage gave way and precipitated the patient to the roof, 40 feet below. He struck on the head and left side, producing an incised wound, about two inches and a half in length, on the left side of the forehead; dislocation of the left elbow; fracture of the right radius

about one inch and a half above the wrist, the fragments having at this point ruptured the skin, making a wound about an inch in length ; fracture of right half of pelvis. The dislocation was reduced previous to his admission to the hospital.

On admission, four hours after the accident, the patient did not show any evidences of shock, talked well, and suffered but little pain.

The wound communicating with the formerly dislocated elbow joint was carefully cleansed, a drainage tube inserted, and antiseptic dressings applied. The arm was placed in a rectangular suspension-splint ; the other wounds were also dressed antiseptically.

July 7th. Slept some during the night. No fever. The wound at the elbow was dressed.

July 12th. Last night tetanus set in. The arm was amputated at the middle of the humerus, and during the operation the nerves were stretched in the amputation-wound.

July 13th. The stretching of the nerves yesterday had no influence at all upon the tetanus, the paroxysms of which increased during the afternoon and night. In the night the patient became delirious, and died this morning.

CASE 13.—(Dr. Fenger, Chicago, 1880.)

SYNOPSIS.—*Punctured wound of the right hand. Four days after the injury, trismus and opisthotonos. Fourteen days after the injury, stretching of medianus ulnaris, and cutaneous internus longus nerves in the sulcus bicipitis. Immediate relief of the symptoms. Trismus and tetanus entirely disappeared after four days. Paresis in the territory of the medianus and ulnaris nerves for seven months. Neuralgic pains along the trunks of the nerves stretched, and hyperæsthesia on the dorsal side of the third and fourth fingers for three weeks. Recovery.*

W. H. O'Connor, a carpenter, 43 years of age, entered the hospital July 10, 1880. On June 26th he ran a rusty ten-penny nail into the palm of the right hand, half an inch anterior to the pisiform bone. The nail projected from a board about four inches, and the wound was made by striking the hand against it. When he pulled the nail out, the blood spurted in a continuous stream, and he lost about half a pint. He had a stream of cold water running upon the wound the whole night to "get the rust out," and afterward put goose-oil on it.

Four days later, he experienced pain and swelling in the palm of the hand, and the fingers became stiff. He sought medical aid

at the Central Free Dispensary, and was there directed to use poultices of flaxseed meal and bread-and-milk on the wound.

The pain radiated upward from the hand to the mouth and then to the neck. The trismus was so painful that he pounded himself on the sides of the jaw to produce relaxation of the contracted muscles, but without effect. The night before he entered the hospital, he had two men pound and squeeze the muscles of the neck and jaw, and forcibly open the mouth, but in vain. The pain and swelling of the hand subsided after three or four days, but the trismus and opisthotonos increased to such an extent that he became afraid they would choke him, and for this reason came to the hospital.

On admission, he was found to be a well-nourished, robust-looking man. In the posterior part of the thenar of the fifth finger of the right hand was a small cicatrix from the punctured wound which had healed, with no swelling around it, but tender to the touch. The pain radiated upward along the inner aspect of the forearm and arm. The jaws could not be separated more than one-sixth of an inch, and the posterior muscles of the neck were so stiff that the head could not be moved. He was ordered calabar bean, hydrate of chloral, and bromide of potassium.

July 11th. As the trismus and opisthotonos were the same as on the preceding day, nerve-stretching was resorted to. An incision, two inches and a half in length, was made in the middle third of the arm, over the *sulcus bicipitis*. The internal cutaneous, median, and ulnar nerves were taken out of the wound, stretched vigorously in both directions, pressed between the fingers and an elevator of the palpebræ with which they were taken from the wound, and then re-inserted in the wound. No drainage tube was inserted. The wound was closed with antiseptic silk, and Lister dressing applied.

July 12th. Pulse, 64; temperature, 99.5°. Last night, eight hours after the operation, he was able to open the mouth a little more, so as to allow the tongue to pass out. The stiffness of the neck continued the same. He slept well during the night, and to-day, twenty-four hours after the operation, he feels better, and is able to open the mouth sufficiently to admit two fingers. The neck is much less stiff than it was last night, and he can move the head a little. The internal medication was continued.

July 13th. The patient slept well and feels much better. He can now open the mouth freely and move the neck, but the latter is still a little stiff and somewhat painful when moved. The third,

fourth, and fifth fingers are painful, and so far paralytic that he can flex them but very little, but is able to extend them. Paresis of the ulnar and median nerves is also present.

July 14th. There is still a little pain in the nape of the neck ; no stiffness in the jaws. There is still pain in the third, fourth, and fifth fingers. The patient slept well all night.

July 15th. The patient complains of pain along the course of the nerves which were stretched, considerable enough to render five hypodermic injections of morphia necessary during the day. No stiffness in the jaw or neck. Discontinued the calabar bean, hydrate of chloral, and bromide of potassium.

July 16th. The patient feels numbness on the flexor side of the forearm. He can move the thumb slightly, but can only slightly flex the fingers. There is occasionally stinging pain on the dorsal surface of the hand, and shooting pains in the fingers. Pulse, 62 ; temperature, 98.5°.

July 18th. He complains of twitchings in the fingers, particularly the middle and ring fingers, which are very sore along the dorsal surface. There is no pain along the inside of the arm, but he complains of pain in the shoulder ; is up and around the whole day ; sleeps well ; and his appetite is good. The interrupted current was ordered to be applied once a day to the arm and hand.

August 7th. The patient can move the fingers better, though flexion is not yet normal. He still occasionally complains of pain in the palm of the hand and the middle and ring fingers.

The patient was discharged to the County Poor-house, cured.

March 1, 1881. Anæsthesia and paresis of the forearm commenced to disappear rapidly.

April 15th. There is no atrophy of the forearm, no anæsthesia or pain ; there is a little stiffness of the fingers, but active mobility is normal, so that he can flex the fingers until the ends of the fingers touch the palm of the hand. Sensibility of the fingers is normal, but they are a little colder than the fingers of the hand not operated upon.*

CASE 14.—(Pepper, London, 1881.³⁶) A railway signalman received a crushing injury of the hand, with a lacerated wound. Three fingers were torn off. Antiseptic dressing was applied, and the wound healed rapidly. Two weeks after the injury was received tetanus set in. The median and radial nerves were

* As a remarkable feature, we here mention that, after the anæsthesia and paresis of the nerves stretched had persisted for seven months, in spite of all kinds of treatment, they disappeared spontaneously in the course of two weeks.

stretched. The paroxysms were relieved for two days, but on the third day after the operation the spasms recurred violently, and the patient sank and died.

CASE 15.—(H. D'Ollier, Paris, 1881.³⁷) A man, 54 years of age, received the following injuries from a tree falling upon him: flesh wound on right forearm; large, lacerated wound on the extensor side of the left forearm, whereby the extensor tendons were denuded; subcutaneous fracture of the left femur. A diffuse, phlegmonous inflammation took place, on the third day after the accident, in the right forearm, which was subdued by large multiple incisions. On the tenth day, at a period when the condition of the wounds was very favorable for speedy healing, painful spasms of the flexor muscles of the forearm set in, causing the fingers to be very firmly flexed. These paroxysms increased in number and violence for a week, and then symptoms of tetanus commenced; lockjaw; stiffness of the neck; difficulty in swallowing; and tetanic contractions of the muscles of the abdomen and lower extremities. The patient was anæsthetized, the median nerve laid bare in the middle of the arm, and stretched vigorously in both directions. After the operation the pain and muscular spasms ceased, and extension of the fingers could be more easily accomplished. Recovery.

CASES 16, 17, 18, 19, 20, and 21.—(1879.³⁸) Nankewell reports two cases of traumatic tetanus, in which no effect followed nerve-stretching. Langton, Verneuil, and Cowper each report an unsuccessful case of nerve-stretching in tetanus, and Ratton places on record a case of tetanus, treated by nerve-stretching, which was followed by recovery.

VI.—LOCOMOTOR ATAXIA.

It was the excruciating and distressing pain, which, at a certain period of this disease, embitters the existence of the patient, that furnished the indication to Langenbuch to try nerve-stretching. The unexpected effect of the operation, namely, that not only the pain was relieved, but also that the symptoms of incoördination disappeared, attracted well-merited attention, as all the remedies hitherto employed in this disease had been devoid of practical value and, in fact, had appeared to exert no influence whatever upon the course of the disease.

The seven cases which are reported below are of too recent date to enable us to determine whether or not the beneficial effects of the operation were lasting or finally curative. But, nevertheless, the operation has manifestly been of benefit in two very important directions: First, as to the pain. The records show that it has been relieved, or rather has entirely disappeared in the five cases in which pain was noted among the symptoms. Second, as to the ataxic symptoms, especially incoördination, loss of muscular power in the limbs affected, and consequent inability to walk or stand. These symptoms entirely disappeared in two cases, were markedly diminished in two cases, and partially diminished in one case in which the muscular strength increased. In one case the effect may have been experienced, but is not recorded, and in one case only was the operation of no effect as regards these symptoms.

The nerves stretched were both sciatic and crural nerves in one case; both sciatic nerves in three cases; the left sciatic nerve in one case; the axillary nerves in one case; and the right median and ulnar nerves in one case.

It may be that the two cases in which the ataxic symptoms entirely disappeared were cases of only short duration, as in Langenbuch's case, in which the patient died accidentally during the chloroform narcosis for the second operation upon the upper extremity, the autopsy showed no anatomical lesion in the posterior columns of the spinal medulla.

But that even inveterate cases may be effectually acted upon by the operation is shown by Debove's first case, in which, although the disease was of six years' standing, and the patient had been confined to his bed for eighteen months previous to the operation, the pain not only disappeared, but the severe ataxic symptoms also diminished so considerably as to allow the patient to stand erect and walk a few steps in two weeks after the operation.

In our own case no effect upon the ataxic symptoms was experienced. It is possible, however, that the complication with large bedsores, and the subsequent low condition of the patient, masked a beneficial effect which might otherwise have been apparent. On the other hand, the most characteristic symptom, namely the incoördination, may not be affected at all, as may be seen in Erlenmeyer's case.

As to what and how many nerve-trunks it is advisable to operate upon in a case of locomotor ataxia, we shall take into consideration the following facts: The very interesting and unexpected crossed and distant effect of the nerve-stretching, which was first seen as an exception in Andrews' case of painful contractures of the lower extremities, but which has now been fully confirmed, as a rule, in locomotor ataxia, and which has been further confirmed by Brown-Séquard's experiments, leaves it an open question whether it might not be sufficient to operate upon only a limited number of the nerves of the extremities affected. When Esmarch stretched the axillary nerves for pain in the upper extremities, the ataxic symptoms of the lower extremities ceased. When Debove stretched the right median and radial nerves, the pain disappeared in the opposite arm, and diminished in the arm operated upon. This crossed and distant effect is by no means constant. It has been noted in none of the other cases, and we have as yet no means of determining beforehand in what cases such an effect will take place, and in what cases it will not.

It, therefore, seems at present to be the most natural plan to take the indications for the place of operation from the pain, and to commence to stretch the nerve-trunks in the territory in which the most severe pain is suffered. From the effects of this first operation, indications for the

stretching of other nerve-trunks may be determined. As the inconveniences subsequent to the operation are very few and insignificant, and as the course of the disease is sufficiently chronic as not to render any rapid surgical interference imperative, it seems to us that no contra-indication exists for this plan of experimental operating by degrees.

CASE I.—(Langenbuch, Berlin, 1879^{40, 41}; Westphal, Berlin, 1881.⁴²) A merchant, 40 years of age, had been several months before attacked with symptoms of *tabes dorsalis*. When he entered the hospital the symptoms were so pronounced that there was no doubt that the disease was *tabes dorsalis dolorosa*. Besides thoroughly developed ataxia, there were peculiarly intense shooting pains in all four extremities. Romberg's symptom was present, and the typical disturbances of sensibility, especially in the lower extremities. In walking, the patient threw off his slippers without being aware of it, and was unable to distinguish what he was walking on. From time to time, constriction, as of a belt, was felt. The reflex sensibility was somewhat augmented. The knee symptom was not present, but a high degree of myosis, and hyperæsthesia of the skin were observed, especially on the anterior surface of the femur. All these disturbances of innervation were also present, though in a less degree, in the upper extremities. The patient was tortured by incessant pain, in spite of all sedative treatment.

As the pain was most intense in the region of the left sciatic nerve, Dr. Langenbuch proposed to stretch it. With the patient's consent the operation was performed September 13, 1879. The trunk of the sciatic nerve appeared somewhat reddish, injected, and swollen. Under anæsthesia, it was thoroughly stretched, and sutures and antiseptic bandages applied. The wound healed in a few days, the patient having experienced entire absence of pain from the moment of the operation. The immediate consequence of the stretching was motor and sensory paralysis, which disappeared in a few days without any return of the pain.

Twelve days after the first operation, Dr. Langenbuch was able to proceed to the stretching of the right sciatic and both of the crural nerves, in one operation. Under antiseptic treatment the wounds healed in a short time. This operation was followed by the same results as the former; the pain disappeared perma-

nently, and the normal mobility and sensibility were regained in the course of a few days.

When the patient made his first essay at walking, he expressed himself that he now at least knew what he had beneath his feet. The first attempts at walking were feeble and incomplete, but improved rapidly. The unexpected fact was soon discovered that the ataxic symptoms had disappeared at the same time. When the patient had so far recovered that he was able to walk moderately well, he left the hospital.

Later he entered another hospital, when it was found on examination that the ataxic symptoms had entirely disappeared, and that there was no diminution of sensibility in the lower extremities. The patient was able to walk with the aid of a cane, and complained only of the above-named symptoms in the upper extremities.

As the pains in the upper extremity were increasing, and as the result of the operations on the lower extremities had been so unexpectedly favorable, it was resolved to stretch the nerves of the upper extremity, but the patient died unexpectedly during the chloroform narcosis. The autopsy, made by Dr. C. Westphal, demonstrated conclusively that in this case there was no disease in the posterior columns of the spinal cord.

CASE 2.—(Esmarch, Kiel, 1880. ⁴³) A brief notice was made, in the Ninth Congress of German Surgeons, held in Berlin in 1880, of a case which Quinke had diagnosed as *tabes dorsalis*, in which violent pains in the upper extremity were experienced. The nerves in the axilla were stretched. The operation was followed by very satisfactory results: not only the pain in the upper extremities, but also the pain in the lower extremities, as well as the other symptoms of ataxia ceased.

CASE 3.—(Erlenmeyer, 1880. ⁴⁴) A man, thirty-nine years of age, suffered from so-called "rheumatic" pains in the right leg, in 1871, which continued increasing slowly until 1878, when manifest symptoms of ataxia were noticed. In December, 1878, paresis of the bladder occurred. In the summer of 1879 the patient became unable to walk or stand. In November, 1879, exquisite ataxia of the lower extremities set in, with a very considerable lack of coördination. The extremities were cold; sensibility was diminished; patellar reflex absent; the patient could not feel the position of his legs at all. He had very little "druckkraft" (pressure-force). Most of the time there was no pain at all in the legs. Incontinence of urine was present.

Diagnosis, *tabes lumbalis* ; prognosis, unfavorable. All other known remedies having been tried in vain, nerve-stretching was resorted to.

June 22, 1880, the patient was anæsthetized with chloroform, an incision made between the great trochanter and the *tuber ischii*, and the right sciatic nerve exposed. It was lifted from the wound, stretched vigorously, and twisted. The nerve was flattened and of a grayish color.

July 3d. The ataxia, sensibility, and tendon reflex were exactly the same as before the operation, but the "druckkraft" was considerably augmented, as might be seen by comparing the right leg which had been operated upon, with the left leg which had not. The patient was still unable to stand up.

At this date the left sciatic nerve was stretched in the same manner as in the former operation, strict antisepsis being maintained in each operation. In spite of the antiseptic precautions, however, erysipelas set in in the wound and continued for three weeks. Examination then showed an augmentation of the "druckkraft," but no amelioration whatever of the other ataxic symptoms.

CASE 4.—(Debove, Paris, 1880. ⁴⁶) A man, fifty-six years of age, was seized, in 1874, with vehement pains in both legs, and six weeks later symptoms of incoördination appeared. This was followed by pains in the upper extremities, but no incoördination was here noticeable.

November, 1880, the patient entered the hospital. He complained of attacks of severe pain in the lower extremities, which increased in violence at night. Subcutaneous injections of morphine were ordered, and as much as three grains was given in the course of twenty-four hours. Every one or two weeks attacks of gastric, urethral, and vesical pain were experienced. Slight cystitis also existed. Incoördination was present only in the lower extremities, which were highly atrophic. The patient had been obliged to remain in bed for the previous eighteen months. There were bedsores on his back.

November 18th. An incision was made in the middle of the thigh, the left sciatic nerve retracted, and stretched vigorously in both directions. The nerve was replaced, the wound closed, and antiseptic dressing applied. From the day after the operation no pain was felt in any of the extremities, and only slight pain in the wound. Formication, from time to time, commenced in the left leg, and from there extended to the right leg. Two days later

there was no pain whatever. He could feel his legs in the bed. The incoördination in both extremities had diminished. Two weeks after the operation no return of the pain had been experienced. The sensibility in the lower extremities was normal. He could move the legs so much better that only traces of the incoördination remained. The patient could now stand erect and take a few steps with the support of another person. The wound did not heal by first intention. The gastric trouble disappeared.

CASE 5.—(Debove, Paris 1880.⁴⁶) On December 16, 1880, a case of locomotor ataxia was operated upon, in which the constant severe pains with exacerbations were mainly confined to the upper extremities. The right median and radial nerves were stretched. After the operation the pain diminished in the right arm and disappeared entirely in the left arm; and in the lower extremities the plantar anæsthesia diminished considerably on the left side. The incoördination was so much ameliorated that the patient was able to walk without help. He is now able to sleep regularly.

CASE 6.—(Fenger, Chicago, 1880.⁴⁷)

SYNOPSIS.—*Locomotor ataxia of two years' duration. Incoördination of muscles of lower and upper extremities. Oculo-motor paresis with diplopia. Fulgurant paroxysmal pains in lower extremities. Stretching of both sciatic and crural nerves. Healing of wounds by first intention. Cessation of paroxysms of pain. No change in the rest of the ataxic symptoms. Bedsores. Pyæmia. Death.*

Charles Grundin, a cabinet-maker, fifty-four years of age, was admitted to Cook County Hospital, September 6, 1880. The patient states that his family history is good. His parents died of old age. No hereditary tendencies; no venereal disease. He has used stimulants moderately. Habits and surroundings good. Has had several attacks of intermittent fever of short duration; once suffered from slight dysentery, and once from acute rheumatism. These diseases all occurred twenty years ago. Since that time his health has been uniformly good until two years ago, when he had an attack of incoördination and numbness of the lower extremities, slight strabismus and ptosis of the left eye. These symptoms were relieved by medicinal treatment in six weeks. Since this time, excepting a slight numbness of the feet and fingers, he has been perfectly well, until four weeks before he entered the hospital, when he began to have difficulty in walking, particularly in the dark. He lost considerable strength in the

lower extremities, and the pain in the feet and the ends of the fingers increased.

On admission the patient said that, generally speaking, he felt pretty well; his appetite was excellent, bowels regular, and he slept well.

On examination we found a marked loss of coördination in the lower extremities; he was unable to stand erect when his eyes were closed or when he looked upward. There was a marked diminution of cutaneous and muscular sensibility, the patient being unable to perceive the contact of his feet with the floor, the feet seeming to rest on sand. There was paresis of the *motor oculi* nerve, which was noticeable on account of the diplopia. The patient stated that he had noticed a diminution of his visual powers, especially in the right eye. He complained of occasional difficulty in micturition, it being more frequent and requiring considerable effort. His hands and arms were tremulous, so that he was unable to hold any object steadily. He did not seem to be annoyed by any undue irritation regarding his sexual desire, although he stated that previous to the present illness he had been addicted to excessive indulgence in sexual luxuries. Examination of the vital organs revealed nothing of note.

September 14th. Was given fluid extract of ergot, and iodide of potassium. The patient complains of fulgurant pains in the left thigh and leg, which recur several times daily.

October 8th. Feels as though his legs were asleep.

October 14th. He can obtain rest and sleep only by means of morphine.

November 6th. The patient has been unable to walk for the last three weeks, and has been confined to his bed. Suffers pain in both lower extremities. Sleep can only be obtained by the use of morphine. His appetite is poor and he is getting weaker.

December 28th. The patient was anæsthetized with ether, and Dr. Fenger proceeded to stretch the nerves of the lower extremity. An incision was made on each side, just below Poupart's ligament, the crural nerves exposed, stretched, replaced in the wounds, drainage tubes inserted, the wounds closed with aseptic silk, and Lister dressing applied. The patient was then turned on his face and both sciatic nerves stretched simultaneously, the left by Dr. Fenger and the right by Dr. Verity. Drainage tubes were inserted, the wounds closed with aseptic silk, and Lister dressing applied.

December 29th. Temperature, 101° . Some pain in the right

thigh and leg, which was controlled by a hypodermic injection of one-fourth grain of morphine.

December 30th. Pulse, 112; temperature, 99°. The patient has less pain.

January 3, 1881. The wounds were dressed. They looked well and were agglutinated. No suppuration. The sutures and drainage tubes were removed. He does not complain of any pain.

January 10th. The wounds are entirely healed, and the Lister dressing was removed.

January 20th. The patient's appetite is poor; strength gradually failing. He is not able to stand up. There is no increase of strength in the legs, but he does not complain of pain in the extremities any longer.

February 1st. A bedsore was found over the sacrum. The patient feels weak, has no appetite, but no pain.

February 10th. Pulse, 110; temperature, 103°. The bedsore is considerably enlarged and suppurating. The patient is slightly delirious.

February 15th. The patient died this morning on account of pyæmia from the extensive bedsores.

CASE 7.—(Socin, Basle, 1881.³¹) A man, 33 years of age, was affected with ataxia, which was characterized by marked troubles of coördination, constricting pain in the body, and violent pain in both lower extremities. The right sciatic nerve was stretched. The wound did not heal by first intention, but, notwithstanding the suppuration, the pain on the right side ceased entirely. The same operation was now performed on the left side. Fourteen days after the second operation was performed, the patient died from multiple embolism, caused by thrombosis in the right popliteal vein.

VII.—ANÆSTHETIC LEPROSY.

CASES 1 and 2.—James R. Wallace (1881⁴⁸) reports, in the *Indian Medical Gazette*, two cases of advanced anæsthetic leprosy, which were both greatly benefited by nerve-stretching. In the first case the disease manifested itself in the arm. After the operation the recovery of sensation was perfect, and the patches of discolored anæsthetic skin recovered their normal color and sensation. The pain, numbness, etc., disappeared, and at the end of two months the improvement seemed confirmed and complete.

From the résumé given above of the different affections of the nervous system in which nerve-stretching has been tried, with the added abstracts of cases, imperfect as it may be, as only a limited portion of the literature has been at our disposal, it will easily be seen that each class of these diseases or affections of portions of the nervous system will have, in future, to be treated of in a separate chapter of its own, as each of these diseases is different, not only as to the indications for the operation, but also as to the prognosis, the effects of the operation, etc.

It is illogical to speak of or discuss indications, effects, and results of nerve-stretching in general, or to talk enthusiastically for or against the operation as such. Von Nussbaum, only two years ago, stated that relapse of the suffering for which nerve-stretching had been performed had not yet been observed, although in some cases four to five years had elapsed since the operation. It will readily be seen that this remark was far too enthusiastic from the present status of our knowledge of the matter. It was only a very short time after this assertion of Von Nussbaum was published, that Czerny made the much less enthusiastic remark, that he would not place any extravagant and exaggerated hopes on the nerve-stretching, but, on the other hand, that he would not deny that the operation was a powerful remedy for the depression of vitality in a nerve-trunk, without its annihilation, and that he would consequently resort to the operation as an *ultimum refugium* in cases in which motor and mixed nerve-trunks had been roused to an abnormal condition of activity from one or another cause. For the sensory nerves he would prefer excision.

Our preceding remarks regarding the necessity of individualization do not permit us to agree with Czerny. This will be seen from several of the facts stated above, namely: A motor nerve, as the seventh, is stretched with perhaps in-

variably good results in mimic spasm. Another principally motor nerve, the twelfth, shows better results by excision than by stretching in spasmodic torticollis. In entirely sensory nerves, as the fifth pair, nerve-stretching has shown somewhat better results than excision, and, finally, the crossed and distant effects from nerve-stretching indicate with sufficient clearness that the benefit of the operation does not depend merely upon the depression of activity in the nerve-trunk stretched, but rather upon its effect upon the nerve-centres, of which we are as yet entirely ignorant.

We should not be surprised if future observers should show that from this effect of nerve-stretching upon the brain and spinal medulla, extensive benefit might be derived from the operation, and give further indications for its advisability in diseases in which it had not previously been tried.

A few remarks only remain before we leave this subject.

The duration of the disease of the nerve does not appear to have any direct influence upon the effect of the operation, as it has sometimes proved successful in most inveterate cases. The condition in which the nerve-trunk stretched has been found, namely: injection, swelling, atrophy, anæmia, or apparent health, has been of equally slight importance as regards the results.

Whether the wound necessitated by the operation has healed by first intention, or after suppuration, or even after complication with erysipelas, it has not affected the final result of the nerve-stretching. The two latter complications, therefore, have done no further harm than the causing of inconvenience to the patient.

As to the question of possible danger attributable to the nerve-stretching, it must be said that, so far as the records go, there has been no danger at all from the stretching of the nerve itself; that is, there has been no neuritis, no tetanus, no permanent paralysis, etc.

As far as the question of danger from the wound is concerned, it may be stated that there is no more and no less danger than from any other incised wound of the same size. It will be almost always in the power of the surgeon to obviate any grave or dangerous complication, by using strictly antiseptic precautions, by being careful of the adjoining organs, by choosing the most appropriate anatomical locality for the operation, etc.

In conclusion, we think that nerve-stretching deserves to have a fair trial, not only in the nervous diseases above referred to, but also experimentally in others, as well of the central as of the peripheral nervous system.

When numerous observations shall be in the future collected, and the cases of homologous affections classified, we shall then have more sharply-defined indications for operation than we have had up to the present time, when neuralgic pains or spasms have, with few exceptions, been the main and only indications for nerve-stretching.

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TUMOR OF THE CENTRUM OVALE.

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CASES of circumscribed lesion of the centrum ovale that give rise to marked symptoms are of great interest in regard to the general question concerning the localization of distinct functions of the brain. The following case is particularly instructive in respect to its clinical features, which fairly admitted of a precise diagnosis. Although the severe criticism of Nothnagel forbids, in our present state of knowledge, a discrimination between the symptomatology of cerebral lesions involving the pars frontalis of the centrum ovale and that of the cortex of the same region, yet, on the strength of Ferrier's experiments, I ventured to localize the disease, in this case, in the upper extremity of the ascending frontal convolution of the left hemisphere.

A colored man, about 50 years of age, was presented at the clinic, who gave the following history: About eight months ago, while at work, his right arm was suddenly seized with convulsive movements, and a few minutes afterward he lost his consciousness for a short time. On recovering from this state of coma he found that his right arm was paralyzed. Since then he had several such attacks. The apoplecticiform seizures were always of short duration, but the spasmodic affection of his arm lasted much longer, and occurred more frequently. Fifteen years ago he contracted syphilis. There are a number of suspicious cicatrices on his legs,

but no other visible signs of the constitutional disease. The only symptom which the case presented at the time of the examination was an incomplete paralysis of the right arm. None of the cranial nerves were affected, and no psychical disturbances were noticed.

The man remained in the hospital until his death, which occurred at the end of the fifth week from the date of his admission. During that time he got large doses of the iodide of potassium. Under this treatment the spasms of the affected limb ceased, but the paralysis persisted. On the day preceding his death he became delirious, and finally fell into a stupor from which he could not be roused.

Autopsy fourteen hours after death. The cranial bones and membranes have a normal appearance. The substance of the brain is of an unusually firm consistence. On making several sections of the centrum ovale of the left hemisphere, a tumor of the size of a large hazel-nut was discovered, occupying the uppermost regions of the pars frontalis and pars posterior of the fissure of Rolando, in close proximity to the cortex. The greater portion of the adventitious growth was situated in the ascending frontal convolution. It seemed to consist of a central portion, having all the marks of a gummata, surrounded by a grayish, softened mass. A similar tumor, but not enveloped by softened tissue, was found embedded in the centrum ovale of the right hemisphere, occupying the median portion of the superior parietal lobule.

THE NATURE AND TREATMENT OF HEAD-ACHES.*

By J. S. JEWELL, M. D.

(Continued from January number.)

THE management of true migraine, or the pure vasomotor type of headaches, presents a number of difficulties. Hitherto but few disorders have proved to be more intractable. But in the last few years some advance has been made, especially in the direction of curative treatment. I may say to you, with a tolerable degree of assurance, that the majority of such cases may be considered as curable, that is, if not associated with some other form of serious disease, more particularly of the nervous system.

The treatment falls naturally under two heads, the palliative and the curative. The former is applicable only to the attack.

Usually, as already said, there are certain premonitory symptoms by which the patient learns to know that an attack is imminent. In the majority of cases nothing of importance is done until the headache sets in, and in many instances hopeless of relief, but little is done to alleviate the pain or shorten the seizure. The suggestions now to be made embrace what I have found as most useful in a reliance upon the experience of others and by my own independent observations.

*A lecture delivered in the Chicago Medical College.

In those cases in which the head is hot, in which there are signs of vascular dilatation and a tolerably firm pulse, rather large doses of the bromides of sodium or potassium (from twenty to forty grains at a dose to an adult), to be duly diluted with water, and to be repeated once or twice in three or four hours, have often resulted (if given early) in diminishing the force of the attack. This treatment, however, is only applicable to those cases in which there is not much nausea, and in which, as already said, there are distinct signs of vascular dilatation and increased heat about the head. If the pain is in part paroxysmal, as in neuralgia, something can be done toward alleviating the headache by giving, in connection with the bromide of sodium or of potassium, or of ammonium, moderate but decisive doses of the tincture of gelsemium, or the tincture of aconite, more especially the latter. Duquesnel's aconitia, which seems to possess peculiar properties in relation to trigeminal neuralgias (to which these headaches, in a measure, belong), is to be preferred. From the one hundred and fiftieth to the three hundredth of a grain may be given every half or one hour, until the effect of the drug is experienced.

But in cases in which there is a decided tendency to disturbance of the stomach and nausea, these measures will not be found so useful.

If the headache is not attended by perceptible elevation of temperature about the head, or by signs of vascular dilatation, one of the speediest ways to procure relief is to give, either by the mouth or by hypodermic injection, a preparation of morphia and atropia in which nineteen grains of morphia and one of atropia are rubbed with 180 grains of sugar of milk. The mixture should be very thoroughly made. Of this mixture, from one to two or three grains may be given by the mouth every hour, until two or three doses have been taken, if necessary, and in most instances the pain will be pretty well relieved.

If, however, on account of nausea, or for any other reason, the powder cannot be taken and retained, a mixture may be made which shall contain nineteen grains of morphia and one grain of atropia in one ounce of distilled water. A drop or two of some dilute acid may be added to aid in effecting thorough solution. The mixture should be filtered and a drop of strong carbolic acid added to prevent the development of microscopic germs in the mixture. Of this from one to four minims may be given subcutaneously, a dose every half hour, until two or three doses have been taken, by which time the pain and the nausea will be, in some measure, if not entirely, under control.

In giving this or any similar mixture hypodermically, great care should be taken to begin with very small doses, if the toleration of the patient toward the drugs is not well known to the physician.

Still other doses, at longer intervals, may be employed for the relief of pain. In some instances, after the pain is allayed and the nausea in some measure abated, it is found difficult for the patient to sleep. In such cases, from ten to thirty grains (according to the circumstances of the case) of hydrate of chloral in a tablespoonful of water may be introduced into the rectum by means of a small syringe, such as the ordinary aural syringe. As a rule, after the patient is under the influence of the opiate, so that the pain is relieved or abated, the chloral will induce a prolonged and comfortable sleep, at the end of which the attack will usually be found to have passed.

In those cases in which the head is not hot, and in which there are no signs of cranial congestion, and in which there is but little nausea, some reliable preparation of guarana, or of the citrate of caffein, or a cup of strong coffee drunk when quite hot, will aid in relieving the pain. But of all the means I have employed to relieve the pain of these

headaches, I know of none to compare with the combination of morphia and atropia that has been mentioned, especially if used hypodermically. It may be employed moderately with advantage, even in those cases in which there are signs of congestion about the head with elevated temperature. But in such instances it is well to associate it with one of the bromides.

In some cases where the attacks are exceedingly severe, inhalations of chloroform, to a moderate degree, may be employed, until other remedies, less rapid in their action, may be brought to bear. So far as medicine is concerned, for the immediate relief of pain in migraine I have nothing further to observe that is worth mentioning to the exclusion of the palliatives just described.

Besides the medical treatment, it is necessary to seclude the patient, as far as may be, from all excitement, whether sensorial or emotional. The room should be darkened. All noise should cease, and, as far as possible, nothing said or done by either the patient or attendants that can excite or disturb the nervous system.

There are some cases, however, in which some relief is apparently obtained by moving about. Such cases, however, are rare, especially if placed under the action of the remedies described.

Relief is sometimes obtained by making the patient quite warm, especially in the application of warmth to the lower extremities, and by making warm, as a rule, rather than cold applications to the head. Occasionally relief is obtained by drawing a band tightly about the head.

An Esmarch bandage may be sometimes employed for this purpose with benefit,—drawn around across the forehead, occiput, etc., and permitted to remain as long as it is comfortable to the patient. In some instances in which there is a strong tendency to nausea, a large draught of

quite hot water will afford relief, especially if it leads to vomiting.

Such, in my experience, are the more important palliative means to be employed just before or during the attack. I should not omit to state that in some cases attacks of this form of headache, especially of the congestive type or kind, are much benefited by the passage, very cautiously, of a galvanic current through broad moist electrodes, from the forehead to the nape of the neck, for a few minutes, and through the cervical sympathetics to the feet. It should never be passed in the opposite direction, that is, through the head, in this class of cases.

Next as regards the curative treatment.

In the first place, it is necessary for physician and patient to understand that cure of a case of migraine is almost as difficult as that of a moderate epilepsy. It can seldom be accomplished in less than from six months to two years of faithful attention to all reasonable details of treatment. In some cases a cure is impossible, where the general health of the nervous system is hopelessly broken.

It is better not to commence treatment at all until the patient is brought thoughtfully to understand that a less term than one year of faithful trial of the plan decided upon is likely to be useless. This is the first thing to be understood. It is necessary, in the next place, to consider most rigidly the question of diet. It should be nutritious, but of the simplest kind. All marginal or side dishes, as a rule, should be cut off, and under no circumstances should anything be taken which has been proved, in the candid experience of the patient, to disagree with the stomach. Care should also be taken not to overload the stomach. In these cases it is absolutely necessary to avoid the use of strong coffee or strong tea. If these drinks are taken as beverages the infusions should be weak. If the patient will not

agree to follow advice in this respect I decline promptly to undertake the case. As a rule, all alcoholic stimulants should be laid aside. A little claret, however, during or after the principal meals, is sometimes attended with apparent benefit, or at least leads to no apparent harm. It is necessary, in the next place, as far as possible, rigidly to avoid serious fatigue, whether bodily or mental, to avoid all undue emotional or other excitement, that the nervous system may not be exhausted either by voluntary action or by excitement. This is a point of great importance. A large amount of sleep should be secured, if necessary, by the use of artificial means. It is necessary also that the surface of the body shall be protected thoroughly by a suitable dress, so that sudden chilling shall not take place, so as to avoid, in this way, unfavorable vascular fluctuations.

Great care should be taken to secure thorough movements from the bowels. Under no circumstances should constipation be permitted. At this point, I think it necessary to drop a word of caution. It frequently happens that the patient, upon inquiry, will inform the physician that regular movements take place daily; but in a surprisingly large number of cases strict inquiry will reveal the fact that either at one or both ends of the colon fæcal accumulations are habitual, notwithstanding some portion of the same is voided daily. These fæcal accumulations are oftentimes the cause of intestinal irritation, which, in its turn, may bring on an attack of headache. I have seen many such cases. It is necessary, finally, to prevent this class of patients from fixed use of the eyes, as in much reading, or as in the work of a seamstress, or in any other occupation which implies minute and continuous exercise of vision.

I would recommend, especially before retiring, protracted hot mustard foot baths, if the feet are cold and, in a

measure bloodless, as they so often are in this class of cases. Every pains should be taken to keep them warm. A light, cool sponge bath, of mornings, followed by thorough frictions, when the bath is well borne, if persisted in daily undoubtedly leads to good results in strengthening the nervous system.

Such are the more important hygienic measures to be faithfully and minutely observed in the treatment of this class of cases. Without attention to them the best directed course of purely medical treatment, as a rule, will fail.

I now come to the question of curative treatment.

If, as so frequently proves to be true, the patient has a light gastric catarrh and more or less imperfect digestion, I would recommend the use of some such prescription as the following :

R

Sodium bromidi,	3 vi	
Acid hydrobromic,	} 3 iii	
Fothergill solution,		
Bismuth subnit.	3 v	
Pepsin sacch.	3 vi	
Tr. digitalis,	3 iii	
Infus. colombæ,	3 vi	℥

Sig. Keep in a cool place. Shake well. Take a large teaspoonful, in water, after meals.

The action of the bromide, given as it is in small doses, seems to be sufficient to diminish reflex excitability, more particularly of the vaso-motor and cardiac nervous systems, to improve the condition of the mucous membrane of the stomach, and to aid digestion. Of course, the use of such a prescription is recommended only in that rather large class of cases in which there is gastric or gastro-duodenal disorder. Under the use of this prescription patients are less excitable, the circulation of the blood about the head is less fluctuating and tricky, sleep upon the whole is better, and, in general, comfort is promoted.

Besides this it has been my habit the last few years to advise (according to the plan pursued by Dr. E. C. Seguin and others) rather large doses of a reliable extract of *cannabis Indica*. This may be either fluid or solid, but if a reliable solid extract can be obtained it is the most convenient. To an adult it may be given in doses of one-third to one-half a grain three times a day; once in the middle of the forenoon, and once in the middle of the afternoon, and, as a rule, on retiring. It may be given alone or in association with other remedies in a pill. From one-third of a grain the advance may be made to one-half or even three-fourths of a grain, until the point is reached of easy toleration of the drug. But the advance of the dose of the drug should be continued until indubitable signs are had of a beginning of its intoxicating effects upon the nervous system. Whenever this limit is reached, one-fourth to one-third the dose necessary to produce immediate symptoms may be taken off, and at this point the dose fixed, just below the point, as already said, of easy toleration of the drug. The remedy should be given without fail two or three times a day; if need be, for six months to one year. When from three to six months shall have passed without a severe attack, the dose may be given twice daily instead of three times, the quantity may be diminished and its use continued, say three months longer, at the end of which time it may be discontinued. If at the end of the three to six months, all reasonable care being taken meanwhile to avoid an attack, if, I say, at the end of this time the headaches do not return, we may feel tolerably certain that a cure has been effected. Of course this does not insure that the patient will never again have an attack of headache, but the series of attacks is broken, and, with care, will never return.

I am in the habit, however, of associating other reme-

dies in various cases with the cannabis Indica. Where there is a great tendency to violent fluctuations tending toward congestions about the head, I have found benefit to accrue from the use of from one to two grains of a reliable extract of ergot given with each dose of the cannabis Indica. In other cases I have associated with it tonics, as they appear to be needed, such as nux vomica, quinine, or iron. In some cases I have found it beneficial to combine with the hasheesh moderate doses of podophyllin, or of aloes, or of belladonna, to fulfil some special indications, but especially to remove constipation.

But in order to be successful, the treatment must be faithfully pursued. Other plans have been suggested, other remedies proposed and tried, but without that measure of success which, in my own hands, the plans of treatment just described have yielded.

As regards the other class of headaches belonging to the vaso-motor class, which depend less upon fixed disease of the nervous system than upon the violence of action of their occasional exciting causes, I shall find it necessary to say but little.

Of course, the first step in the treatment of such cases consists in the removal of the cause, whatever that may be. If the stomach is filled with undigested and indigestible food, it should be removed by the operation of an emetic. If the headache depends upon undue acidity of the stomach the acid should be neutralized. If it depends upon constipation this should be relieved by appropriate means. If it depends upon the loss of sleep and consequent brain wear and tear, rest should be had. If it depends upon excessive brain work or upon great and prolonged emotional excitement, if possible, these conditions should be removed. But whatever the cause, let it be removed. Nevertheless, it is necessary to do something for the relief of the headache.

It is perhaps sufficient for me to say to you that the same measures used to relieve the pain in cases of true migraine will be, according to the situation of the case, useful in relieving pain in these occasional vaso-motor headaches. Rest, abstinence from food, the avoidance of labor or excitement, and the use of some one of the means already described as useful in migraine, constitute all that can be profitably laid before you at this time.

I should not omit to mention that there are cases in which a true migraine is mixed up with a headache depending upon painful organic disease, such, for example, as that already described as arising from affections of the dura. In such cases I have found it necessary to associate small doses of opium or morphia, especially the watery extract of opium, or at times, instead of the opium, codeia, with the cannabis Indica in order to allay persistent pain. Such cases require a combination of plans of treatment, and their management, after what has been said, should be left to your own good sense when you meet with them in the rounds of clinical experience.

CONTRIBUTIONS TO ENCEPHALIC ANATOMY.

PART 10.—NOTE IN REGARD TO THE DIMENSIONS OF NERVE-CELLS AND THEIR NUCLEI.

By EDWARD C. SPITZKA,

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THE view has been recently advanced, that the average size of the nuclei in certain nerve-cells having connections with motor nerves, is proportionate to the power developed in the muscles placed under the innervation of the latter. In various papers * devoted to the announcement of this theory, other inferences are drawn or hinted at, which also have a physiological bearing, and certain objections to such inferences which were made by the present writer are taken up in the last paper of the series quoted. It may not be improper, therefore, to review the argumentative aspect of the questions involved in the light of some well-known facts of neuro-anatomy which seem to have escaped the scrutiny of the writer of the papers referred to.

In regard to the main conclusion of the latter,—that, as a rule, the nerve-cell nucleus of cells related to the innervation of large muscular masses is larger than that of cells related to small muscular masses,—it may be well to say that it has not been questioned by any one. It has probably been an unenunciated idea dwelling in the minds of most neuro-

* "Microscopic Studies on the Central Nervous System of Reptiles and Batrachians." By John J. Mason, M.D. JOURNAL OF NERVOUS AND MENTAL DISEASE, Jan. and July, 1880, Jan., 1881.

anatomists, and one so self-evident that it was not considered deserving of special formulation. It is an old observation that nerve-cells, *as a whole*, are larger in the lumbar intumescence of man than in the cervical, and larger in the latter than in the oculo-motor nucleus. What more natural than that the nuclei should vary with the cells as a whole? As connections of the nuclei with the conducting paths of nerve-force have never been demonstrated, while those with the protoplasm (so-called) are clear, those who are accustomed to draw physiological inferences from structural relations could well afford to rest satisfied with the older observation that the cell, as a whole, varied. Even granting the nerve-cell nucleus its greatest possible rôle, there is nothing in its structure, development, or its reaction under pathological circumstances, that justifies one in looking upon it as the *most* important constituent of the nerve-cell.

The observation made that the nerve-cell nucleus is larger, averagely, at the origin of the crural nerves than at that of the brachial nerves of the frog, adds nothing to our knowledge of the relations existing between dimensions and function, beyond a histological confirmation, which, to many, will naturally appear of but a secondary value. The dimensions involved are extremely minute; this by itself constitutes no drawback, but it becomes one when we take into account the fact that the variations in the size of the nucleus have not been shown to be constantly proportionate to the demonstrably important part of the nerve-cell,—its protoplasmic mass. A careful scrutiny of nerve-cells from different parts of the nervous system (and I am now speaking of nerve-cells irrespective of their real or presumed functional rôle) will show that, side by side, cells of the same shape and dimensions have nuclei varying considerably in size; it would not be difficult to demonstrate small nuclei in some large, and large nuclei in some small cells.

Few would, I believe, be willing to follow the author referred to where he leaves his measurements to indulge in speculation. Even he himself will on reflection admit the statement that the nucleus "probably constitutes the true cell" * to be an altogether gratuitous assumption. That the nucleus is the one permanent ingredient of the nerve-cell, present from the embryonic period throughout life, and serving as a centre for fibril condensation, as the researches of Schmidt on the human, of Hensen on the rabbit's embryo, and of myself on the *Menobranchus* have shown, proves the nucleus to be an important morphological element, but it does not prove it to be anything more nor less than a nucleus for all that. Few things in histology are so well established as that the nerve-cell nucleus is a true nuclear body.

In mentioning the very sound conclusions of Stieda, who seems to have clearly established that the nuclei vary with the cells containing them in the different attitudes of the cord, prior to the undertaking of the measurements which form the basis of the papers referred to, their author claims that Stieda does not fairly state the ordinary view, when he cites his observations as having "great weight against the conclusion that only the large nerve-cells are connected with motor fibres." † Now a perusal not only of the older neuro-anatomical literature, but of many recent essays will show the critic that Stieda has fairly stated not the ordinary view—for that he does not claim,—but a very prevalent one, fostered by the ambiguous statements of standard authors. ‡ In exposing the error of that view he therefore did a substantial service. The writer of the papers under

* JOURNAL OF NERVOUS AND MENTAL DISEASE, Jan., 1881, p. 83.

† JOURNAL OF NERVOUS AND MENTAL DISEASE, Jan., 1881, p. 83.

‡ Dr. Richet commits himself to the view of Charcot that "where there are motor centres there are large cells, this is true of the cerebral cortex as well as of the spinal axis."—"Physiology and Pathology of the Cerebral Convulsions," by Charles Richet, translated by E. P. Fowler, M.D. See also Luys' "Recherches, xc," Paris, 1865.

consideration does not himself seem to be altogether free from a very similar error, for he says "it may be true that all large cells connect with motor-nerve filaments," which, unless I am mistaken, he has advanced more positively in a verbal communication to the American Neurological Association, when both Dr. Putnam and myself* cited observations conflicting with it. These observations and other well-established facts I herewith present in detail, and I shall open with the single one which the writer in question discusses in his last contribution.

On a former occasion† I stated that in the Iguäna "the average dimensions of the cell nuclei of the auditory-nerve nucleus equal those of the motor nuclei of the medulla and cord, and exceed some of them, and that the same statement applies to the cells as a whole." I had also made the same statement regarding the large-celled division of the auditory nucleus in man, on the occasion when one of the papers under notice was read. In evident reply to this statement, but without any disfiguring reference to myself or any one else as the source of the objection, it is stated:‡ "I would suggest, however, to those who may feel disposed to regard these cells as connected with the sense of hearing, that such a view involves giving to this apparatus, in its central portion, a structure almost universally admitted to be motor, like, for example, that concerned in raising the lower jaw; whereas in the central structures for vision and olfaction the cells are all very small."

I am somewhat embarrassed as to the propriety of accepting this suggestion as one directed to my individual address, for the customary reference to the source of the opposing view has been omitted. But as I am not aware of any one

*JOURNAL OF NERVOUS AND MENTAL DISEASE, 1880, pp. 476, 477.

† The brain of the Iguäna. JOURNAL OF NERVOUS AND MENTAL DISEASE, 1880, July.

‡ *Loc. cit.*, p. 81.

else having made the same objection in connection with the theories involved in the papers under consideration I shall treat them as directed to myself, leaving the responsibility of an eventual error with the author. In the first place, without insisting on fine verbal distinctions, I would make the counter suggestion, that there is nothing in the structure of any nerve-cell, whether it have demonstrable connections with the motor periphery or not, which the wildest physiological fancy could even remotely construe as a "motor" structure; muscles and cilia have motor structures, not nerve-cells.

It is known, as positively as anything is known, that a nerve nucleus of the human oblongata, which has no possible connections with any other nerve-root than that of the auditory nerve, contains cells rivalling in size the largest known cells of the nervous system, and presenting in their shape some resemblance to what are ordinarily termed motor cells. I therefore consider them as related to the sense of hearing, and their dimensions, so long as no other connections than with a sensory nerve are found to exist, as conflicting with any view which would regard size as necessarily limited to cells having motor connections. The author quoted does not seem to have considered the possibility of these cells being related to motor fields as reflex cells mediating the reflexes from the auditory to the muscular periphery, which would harmonize with the view he follows, and not necessitate the questioning of a universally accepted fact of anatomy for the sake of a theory.*

The appended clause: "Whereas, in the central structures for vision and olfaction, the cells are all very small," involves the turning-point of the inquiry. It is surprising that such a statement could be made. Leaving out of sight for a moment all central structures, and limiting ourselves to the

* This large-celled nucleus is identifiable in the iguãna.

nervous layer of one of these very peripheries, what do we find? That the retina itself contains nerve-cells of decidedly large dimensions; namely, of twenty to forty micromillimetres and beyond that. Here there is no room for a quibble as to other problematical connections of the cells; they are a part of the immediate recipient area itself! This fact alone disposes of the question raised.

But let us go further. The acoustic ganglia of fish contain large fusiform elements. The ganglion of Gasser and the intervertebral ganglia on the posterior nerve-roots contain cells of the larger size, and with very distinct and large nuclei. The same is true of the cerebellum. Now, whatever function the intervertebral and analogous ganglia exercise, it is safe to exclude any relation to the voluntary muscles! Whatever distant and indirect connection the cerebellar cell of Purkinje has to cerebral "motor" centres, it is certainly not connected with any centrifugal tract! In the light of all we at present know about the cell-forms mentioned, we are bound to consider their proximal connection to be with sensory nerves and with sensory tracts.

The researches of Flechsig have shown that all the great tracts connected with the cerebellum develop *toward* that brain segment, with one exception. Those tracts are centripetal, and therefore sensory. One is the restiform column, another the inner peduncular division, a third a great part of the auditory-nerve root. The *nucleus fastigii*, with which the auditory nerve connects, has cells which cannot be classed among the smaller variety. One tract which connects the cerebellum with the cerebrum and the subthamic region,—the brachium conjunctivum, developing like other centripetal tracts *toward* the cerebrum, is connected with the beautiful ganglion tegmenti, composed of cells of 45 micromillimetres. Here again are large cells connected with a centripetal, *i. e.*, sensory tract.

The cells of the ganglion geniculatum externum, exclusively connected with the optic tract, are also of a large size; namely, from thirty to fifty micromillimetres in length, and ten to twenty in width.

The following cells of *large* dimensions have demonstrably only sensory or centripetal connections, as far as their relations to the periphery are concerned: 1. The cells of the intervertebral ganglia. 2. Those of the ganglion of Gasser. 3. Those of the acoustic ganglion in fishes. 4. Those of the ganglion geniculatum externum. 5. Those of the nucleus tegmenti. 6. Those of the visual area of the occipital cortex (solitary cells of Meynert).

The following cells of large dimensions are, as far as anatomical and other facts permit us to adopt a conclusion, also connected with sensory peripheries: 1. The large cells in the deep division of the external thalamic zone. 2. The inflated giant-cells of the probably auditory centre in the cortex in the cat,* recently described by one of my pupils. 3. The flasked-shaped cell of Purkinje. 4. The cells of Clarke's columns.

The following are undoubtedly or very probably connected, at least at one pole, with sensory peripheries: 1. The gigantic cells of the auditory nucleus (100 micromillimetres by 20). 2. The large cells of the deep gray of the optic lobes. Concerning the latter I have already expressed the view, that they mediate reflexes to lower motor altitudes governed by retinal impressions.

Either the statement that all large cells are probably connected with motor filaments, if it requires to be made at all, should be accompanied by so many qualifying clauses as would render it practically void of any meaning, or, better, it should be left unsaid.

It is true that we have large nerve-cells in the giant-

*A new cortical centre by Graeme M. Hammond, M.D., *N. Y. Medical Record*, March 19, 1881.

pyramids of the paracentral lobule and in the lumbar enlargement, but to pick these out, to base a theory on them, and to force some conflicting facts under the conception of "doubtful," and to ignore others altogether, is not a logical procedure.

If any generalization is to be attempted as to the relation between the size of a nerve-cell, or that subsidiary element, its nucleus, and the periphery with which the former is connected, a fairer comparison should be made than has been attempted in the papers under criticism.

The cells and their nuclei in the lumbar enlargement should be compared with those of the lumbar intervertebral ganglia, those of the cervical enlargement with those of the cervical intervertebral ganglia, those of the facial with those of the auditory nucleus, those of the trigeminal motor nucleus with those of the Gasserian ganglion, those of the hypoglossal with those of the glosso-pharyngeal nucleus, the giant pyramids of the paracentral lobule with the solitary cells of the occipital lobe—and so on.

If the researches on which the statements criticized appear to have been based had not been limited to reptiles and frogs, the facts would have been recognized: 1st. That the cells of the "sole" auditory origin are not "uniformly small,"* but that there are three calibres, a small, a large, and a gigantic; the former two having no other even probable peripheral connection than with the auditory nerve. 2. That the cells of the facial nucleus are of the large kind in man. 3. That the large cells scattered near the raphe and in the reticular field have not been confounded with the cranial nerve nuclei by any one; they are the essential ganglionic elements of the general reflex field of the oblongata.†

* *Loc. cit.*, pp. 80, 81.

† And it is well to bear in mind that cells corresponding to and exceeding the dimensions of those of every altitude of the cord are here found.

So far as shape and dimensions of nerve-cells are concerned, I can see nothing in the measurements given or the basis of the conclusions criticized, that either adds to our existing knowledge or conflicts with the following, which I stated about a year ago, and which still seems to me to represent our existing state of knowledge on the subject :

“ The central tubular gray masses vary in size with the periphery projected in those masses. A large muscle or group of muscles will have a larger nucleus than a small muscle or group of muscles.

“ There is a tendency in higher animals to a differentiation of the motor cell-groups into sub-nuclei related to separate muscles or groups of muscles.

“ Hypertrophied segments of the body, such as the extremities, are accompanied by lateral extensions of the cornua, in which flexor and extensor muscles probably occupy the same relative position as the one stated for the general flexor and extensor masses.

“ In this direction a gross error has been committed, and is repeated every day, one for whose origin the French anatomists, particularly Luys, are largely responsible ; while to Charcot and his followers we owe its dissemination. They have stated the *large* nerve-cells to be motor, and *per contra*, the small cells to be sensory. Now, I can show that very small cells are found in unquestionably motor nuclei (origin of third pair), and very large ones in patently sensory centres, such as the *ganglion geniculatum externum*. So that any differentiation of nerve-cells as to functions, based on dimensions solely, is fallacious. It has been also predicated as characteristic of the motor cell, that it is richly multipolar ; but there are, on the one hand, richly multipolar cells in the sensory nuclei, such as the auditory ; and, on the other, we find that undoubted motor cells in very low vertebrates have few processes. So that this line of demarcation must be overturned. So far there is but one character which I should be willing to predicate for the so-called motor cell, namely, that the transition from the body to the processes is so gradual that it is difficult to say where the body ends and the process begins, while in unquestionably sensory cells the transition is always abrupt. Viewing the question in the abstract, there is no *a priori* reason why sensory elements should differ from motor ones. Comparing a large num-

ber of sensory with motor cells, we may say that the character above given seems to be the only one on which an anatomical differentiation can be based; exceptions* there seem to be, but not in the case of any cells whose physiological rôle is clearly established.

"Quite a notable feature in many of the sensory nuclei is the presence of fusiform elements, whose bodies are inflated, and which have two processes—one at each end—and few or no processes otherwise. There is a greater resemblance between the trophic and these sensory nerve-cells than between the trophic and the motor ones.

"The cells in the anterior spinal cornu of the frog are very rich in processes; those of the salamander, and still more so those of the siren, are therein poor; the spinal co-ordination of the frog is correspondingly higher than that of the urodela. The nerve-cell of the cerebral cortex is a free nucleus in the monobranchus, bipolar in the amphiuma (Schmidt), has but few more processes in the scaly reptiles, fewer in the rabbit than in the dog, in the dog than in the ape, and in the ape than in man. (Herbert Major states in his paper on the cortex of a cynocephalus baboon, that he could discover no other difference between the nerve-pyramids of the human and simian cortex than the lesser richness in processes of the latter. I can confirm this observation for macacus and cebus; in the chimpanzee I could discover no difference, taking into account that the staining was imperfect.) The proteus, amphiuma, reptile, rabbit, dog, ape, and man, occupy, with regard to the respective number of processes appended to the cortical cell, the same order which they occupy in the intellectual series!

"Here we perceive that the nerve-cell, following the law which we have announced for the *entire nervous system, gains in functional dignity with the increase of its associations.*

"The lumbar enlargement is more marked in animals possessing powerful posterior extremities (man, kangaroo) than in those possessing weak or rudimentary ones (bat, porpoise). The cer-

*When writing this clause I omitted considering the fact that *all* the nerve-cells of certain insects are inflated, have few processes, and resemble the cells of the intervertebral ganglia of vertebrates. I believe that a careful study of this branch of the subject will overturn all demarcations, even the tentative one set forth by myself. In fact, when we take into account the possibility, nay, great probability, of one and the same cell having different connections, and that specialization of connections is a feature of higher development, we will be led to expect that in the lowest animals presenting nerve-cells, these will be alike, and in the highest ones more unlike. So we actually find it, but the dissimilarity is not, as the writer criticized would have it, one of dimensions at all.

vical enlargement is proportionately larger in the bat, with its anterior extremities over-developed, and in the mole (for a similar reason), than in the dog and rabbit. The oculo-motor and trochlearis nuclei are almost absent in the *pipistrella* bat, and entirely so in the mole, since the eyes of the former are poorly developed, and those of the latter rudimentary. The lower facial nucleus of the elephant follows the hypertrophy of the facial muscles (trunk); the hypoglossal nucleus in the seal is reduced, just as the tongue is limited in motion. The anterior tubercles of the corpora quadrigemina are atrophic in the bat and mole, for the same reason assigned in the case of the oculomotor nuclei; and in the land turtles the extreme atrophy of the parietal muscles in the dorsal region is accompanied by a greater diminution in the area of, and number of cells in, the dorsal gray matter, than in any other animal. *Per contra*, in the axolotl and other urodela, as well as in the apodal lacertians (*pseudopus*) and snakes (*anaconda*, *boa*, *rattlesnake*), the cervical and lumbar enlargements are either scarcely, or not at all perceptible, just as the limbs are absent or insignificant.”*

The industrious observer whose views are here contradicted, will, with the excellent preparations and the leisure at his disposal, find that the most sluggish of the *urodela*, the *menopoma*, the *menobranchus*, and the *amphiuma*, have far larger nuclei in their nerve-cells than the active *anolis*, and *alligator* or serpents. It is the protoplasm of their cells and the processes that are poorly developed in the *urodela*, a fact which is in favor of the current view, and against the doctrine announced by him.

I would further call attention, not in a hypercritical spirit, but with all fairness, that such statements as the following †: “In the *chelydra serpentina* (snapping turtle, weighing 24½ pounds) all the motor nuclei were much larger than those of the smaller specimens. The same rule holds true in frogs and alligators. The smaller the animal, the smaller the cell-nuclei. I have not seen any mention of this fact

*Architecture and Mechanism of the Brain. JOURNAL OF NERVOUS AND MENTAL DISEASE (pp. 4, 17, 45, 76 of reprint), 1879-1880.

† *Loc. cit.*, p. 84.

in any works on anatomy,"—run some risk of being considered as entering the domain of the trivial. No work on anatomy has probably made this special statement, for it is well known that the permanent organs of the body grow, and that their cells grow with the general growth of the body. It would be just as original, and precisely as valuable, for an observer to measure the length of the tail, the dimensions of the scales and tubercles on the skin, the area of the carapax scales, and the diameter of the eyeball, in a young and old snapper, and to deduce the fact that they grow with age. It is well known that the nervous system, and that naturally includes the component elements, grows with the rest of the body, though at a gradually decreasing rate from the date of birth.

It does not seem to have been considered that if there is a constant connection between the size of nerve-cell nuclei and of the muscular masses in supposed relation with them, that there should be some nuclei of the smallest size in the crural enlargement, for there are exceedingly small muscular masses in the foot, as small as any found in the body, and smaller even than the *musculus choanoides*, which is under the oculomotor innervation.

A very remarkable fact, one which seems to conflict with the establishment of any absolute laws in this field, is the relation to each other of the different nuclei of the muscles which move the eyeball in different animals. In man the cells of the abducens origin are far larger than those of the third pair, but in the iguäna the relations are reversed. The cells of the third- and fourth-pair origins are, in the latter, among the larger cells of its isthmus; those of the abducens cells among the most minute. It is to be also borne in mind that the rectus externus of man receives a larger supply of nerve-fibres than any other of the oculomotor muscles, though it is not proportionately larger.

The greater size of the lumbar enlargement in birds is not necessarily accompanied by an increase in the actual ganglionic matter. The researches of a French investigator have shown that much of the enlargement of the region of the sinus rhomboideus is due to a non-nervous development. *A priori*, one should infer that the cervical enlargement should preponderate in its nerve-cells in those birds which have feeble legs and powerful wings, while the reverse would hold good, particularly in the struthionidæ.

The development of a peculiar non-nervous structure in the lumbar enlargement of birds, especially well marked at an embryonic period, is, I think, of some bearing on the recently agitated question of a so-called lumbo-sacral brain in the extinct *sauranodon*, based on the great calibre of the spinal canal at that point. In all embryos there is a temporary enlargement, and even an indication of a rhomboid sinus at this region, and it is not necessary to go beyond this fact and the established development of a non-nervous structure in other sauropsida at the same point, in attempting to account for the dilatation of the spinal canal there found. This matter is not germane to the present subject, but as it has recently been attempted to bring both into correlation, randomly as this was done, I take the liberty of referring to it here.

PART XI.—THE "ASSOCIATION" CELL.

About twelve years ago Meynert* described, as the typical structural element of the fifth or deepest stratum of the frontal, and the eighth of the occipital cortex, certain fusiform nerve-cells. These elements are at the apices of the gyri, parallel in direction with the pyramidal cells of other layers, but at the sides of the gyri and the bottom of sulci they occupy a different position, and are

* Der Bau der Grosshirnrinde und ihre örtlichen Verschiedenheiten. *Vierteljahrschrift für Psychiatrie*, 1868.

parallel instead of vertical to the surface, with their long axes.

The student examining cortical sections from man, will be unable to find a sufficient number of these cells in many regions to justify the designation of their aggregate as a special layer. He will, however, find one statement of Meynert's confirmed, that they accurately follow in direction the arched fibre-bundle which, under the name of a *fasciculus proprius*,* appears to unite the apices of neighboring gyri. It is evident that these cells are forced into parallelism with the fibres of that bundle. Where the processes of the cells are seen connected with fibres, this is usually at the extremities of the long axis, and the fibres are then a part of the arched fasciculus; rarely can a connection of lateral processes (which are generally absent), with fibres penetrating to other cortical layers, be discovered. From their position and their relations to what are evidently functional associating tracts, Meynert was led to look upon the cells as connection points in the functional association of distinct innervations and impressions. Everything so far known justifies this view.

Now it might be anticipated, in agreement with the well-known principle that the development of a given mechanism is greater where the functional rôle is more important, that in the human brain, the seat of the most numerous and intricate associations, these cells should be also more abundant and well developed than in any other animal. Whether this anticipation would be a just one as it stands, I shall now consider.

In a section from the cortex of an ungulate,† I find the largest, most numerous and, in every respect, best differ-

* *Fibræ propriæ.* Arnold.

† I, unfortunately, had the cortical segments from an ox, a calf, and a sheep in the same jar, and am unable to state from which of the three it was obtained. The general type of all is, however, the same.

entiated fusiform cells; they are closely crowded, and the very distinct layer they constitute is in places half as thick as the layer of pyramidal cells (excluding the barren endymal stratum). Their structure is the same as that of the cells described by Meynert. In no other animal have I found them so well-marked; those of the human brain will not bear comparison with them.

This fact might, on first sight, be considered as a fatal blow to the theory of Meynert. And, indeed, if Meynert's theory were to be taken up strictly as announced by that author, without duly considering a complementary theory or rather principle announced in this JOURNAL two years ago,* it would be difficult to ward it off.

It was announced on the occasion referred to, that in higher development the nerve-tracts show a tendency to emancipate themselves from the interruptions offered by intercalated ganglionic matter. That the tendency is to the development of uninterrupted tracts, interrupted tracts being maintained to a certain extent, in obedience to organic needs that do not vary much in the animal range. That in obedience to this law, the long tracts of the cord replace the fibrillary and interrupted network of and near the gray substance, and that the internal capsule and the optic radiations encroach on the interrupted fibre-systems running through the great ganglia.

If this is true of the projection-system, the same must be true of the association-system. No special associating tracts can be identified in the reptilian brain; functional association is mediated by the hypothetical union of cell with cell, and the few fibrils of the white substance, which are seen to run apparently from one cortical area to another, are probably interrupted detachments of the projection-

* Architecture and Mechanism of the Brain. Preliminary considerations. JOURNAL OF NERVOUS AND MENTAL DISEASE, October, 1879. Also, Contributions to Encephalic Anatomy. *Ibidem*, July, 1878.

system. Next, we find associating tracts developed and richly provided with a special form of cell; and in highest development the association-tract loses its interrupting stations, for every ganglionic element to be traversed delays the transmission of the nerve-current. The uninterrupted associating tract is a more perfect mechanism than the interrupted one. If it is asked why such interruptions are ever developed, the answer is that they constitute *etappes* in phyllogenetic development; that no fibre was ever developed in the central nervous system, for which a nerve-cell interruption must not be surmised to have existed ancestrally, and that the interrupting association-cell is nothing but a specialization of the same cell-group, which, in the main, remains a projection-field.

I have observed another fact in this connection. The associating fasciculi are better marked in large animals than in small animals of the same zoölogical order. It seems as if with the diminished distance of cortical area from cortical area, that the intracortical fibrillæ suffice for the performance of those functions which necessitate distinct tracts with greater cortical distances.

PART XII.—THE CONTESTED ORIGIN OF THE TRIGEMINUS.

While the origin of the lesser motor root of the trigeminus from the motor trigeminal nucleus and the raphe is well established, and that of the sensory root from the ascending radicle and the gelatinous nucleus in the level of exit is now universally adopted, considerable doubt enshrouds the question as to which of the two roots receives the descending radicle, which is known to be derived from the mesencephalis nucleus of the fifth pair.

Meynert* traces the external detachment of the descending radicle into the sensory root. I have never seen any-

* Vom Gehirn der Sauge thiere, p. 775.

thing in hundreds of sections taken through every level concerned in this question, and from a number of different animals, that could conflict with this view. It was with considerable surprise, therefore, that I read Forel's statement* that this detachment reaches the motor root, and forms a part of it, undergoing complete admixture with its fibres. There is such an affectation of accuracy and detail in the treatise of the latter author, and I was able to confirm so many of his other observations, that in my larger treatise I adopted his view. In this, as in some other respects, I fear that, like others of Gudden's pupils, Forel has needlessly complicated a very simple question. Such a contradiction as he made should have been based upon only the clearest appearances, especially as experimental confirmation of Meynert's views had been furnished by Merkel.†

But aside from the question of personal equation which has entered into the consideration of this matter, there has lately entered another which presents some amusing features.

In a very full *compilation* of the recent results obtained in brain anatomy, Schwalbe‡ quotes Henle as one of those entertaining the same view as Forel, opposing Meynert, in regard to this matter. In his first edition Henle makes no such statement; the second edition is not at my disposal, but I feel certain that whatever the text may contain, the very excellent and truthful figure 155 has not been expunged. The figure in question represents a powerful bundle of the sensory root derived from above and arching over the motor nucleus. Any one familiar with the subject, could give the figure but one interpretation, namely, that of the strongest confirmation of Meynert's views. If Schwalbe saw this figure, he must have supposed the

* *Archiv fuer Psychiatrie*, vii.

† *Untersuchungen aus dem Anatomischen Institut, zu Rostock*, 1874.

‡ Hoffmann-Schwalbe, ii.

motor nucleus to lie *behind* the sensory root, in failing to correct the evident misinterpretation of the figure. Henle does commit one actual error; he denies, in his first edition, the participation of the ascending radicle in the building up of the sensory root. This was due to the fact that his longitudinal sections are at the same time directed forward and inward. Such sections may be better calculated to reveal the relations of the descending radicle than those I am about to describe, but it is evident from the fact that the ascending radicle runs cephalad* and laterad, that sections running caudad and laterad must fail to show its continuity. In a series of sections made parallel to the direction of the ascending radicle, I can demonstrate the correctness of the generally accepted view, that the ascending radicle is a true trigeminal fasciculus; in fact, I have transverse sections that were conclusive to my mind on this head before I prepared the longitudinal series referred to.

But I was also able to demonstrate, in the latter series, that not only the descending radicle sends at least a great mass of its fibres to the sensory root, and this so clearly that it is remarkable Forel could question this relation, but that, in addition; the processes of cells appertaining to the mesencephalic nucleus of the fifth enter that bundle in the same section. Although I cannot trace a single process all the distance to the sensory root, yet I can trace such beyond the level of the motor root, and the course of the fasciculus, as a whole, is perfectly clear. While I am not able to exclude a participation of the descending radicle in the formation of the motor root, I would insist that there is every ground for stating that that division which is derived from the mesencephalic nucleus passes altogether into the sensory root.

* *Cephalad* equals forward; *caudad*, backward; *dorsad*, upward; *ventrad*, downward; *laterad*, outward. These terms are gaining ground in comparative anatomy, which science has generally been in advance of human anatomy in respect to terminology.

I would, therefore, correct the contrary statement which in excessive deference to authority I was induced to incorporate in the larger essay referred to. The following facts concerning the cells of the mesencephalic nucleus seem to me well established :

1. The cells of this nucleus are equally well developed in all the mammalia so far examined,* and of the same shape and relations in all of them.
2. They are also present (more dorsally though) in reptiles.
3. Their efferent processes accumulate in the outer part of the descending radicle of the trigeminus and leave the brain in the sensory root of that nerve.
4. Other processes of the same cells seem to be connected with the radiatory fibres of the optic lobes.

* Forel says " well developed " in the mole ; this fact may conflict with my theory that the innervation of the lachrymal gland resides in these cells. I do not know in the first place whether the atrophy of the eye in the mole is accompanied by atrophy of the lachrymal gland. The statements of Gudden and his pupils about the optic lobes in the mole have been contradicted by Tartuferi, as that this observation requires confirmation and future study.

Reviews and Bibliographical Notices.

I.—On the construction, organization and general arrangements of hospitals for the insane, with some remarks on insanity and its treatment. By THOMAS S. KIRKBRIDE, M. D., LL. D. Second edition, with remarks, additions and new illustrations. Philadelphia : J. B. Lippincott, 1880; Chicago : Jansen, McClurg & Co.

The republication of this book, after a lapse of twenty-six years since its first and only previous edition, is, at the present time, a matter of considerable interest and calls for special notice. The questions as to the best methods of construction and organization of hospitals and asylums for the insane are now attracting particular attention among specialists, and views in some respects directly opposed to those contained in this volume have of late years found many advocates. The public also, with the admitted increase of cases of insanity and the consequent demand for further means for their accommodation, has begun to take an interest in the matter, and tax-payers are beginning to ask if there cannot be less expensive methods and plans of hospital construction at least for a portion of the insane,—the admittedly incurable and chronic cases. The belief is also gaining ground in the profession and also amongst some of the laity, who have to do with the administration of our public charities, that this class of the insane forms a much larger proportion of the whole than was formerly thought to be the case, and that our expensive hospitals, built on the claim that they were for the curative treatment of mental disease, have become and indeed always have been mere places of detention for by far the greater number of their inmates,—a purpose that could be much better served by less expensive establishments. Questions have also arisen as to the organization of our hospitals and asylums, as to the qualifications and functions of

their officers, and the systems and conditions now existing in these regards have been the subjects of a very large amount of criticism. The reiteration, therefore, of the older and long dominant views, in this second edition of Dr. Kirkbride's work, at the present time, challenges at least a careful examination.

The conclusions here embodied are, he says, "the result of forty-two years' residence among the insane, with the personal responsibility of more than eight thousand patients in three institutions, varying greatly in their character and form of organization, the last thirty-nine years being in that with which the author is now connected and of which he has had the immediate direction since its opening. During this last-named period, too, the author had the experience of eleven years' active service as a trustee of a large State hospital.

"These opportunities for observation, with a desire to subject everything seeming to give a reasonable prospect of success to practical tests, and a pretty general knowledge of what has been done elsewhere in the care of the insane in and out of hospitals, have not only confirmed the writer's opinion as to the correctness of the principles in which he has again expressed his confidence, but have also tended steadily to increase his interest in all classes of the insane and his desire to secure for them such a provision as will be certain to give them every advantage they can receive from the most enlightened care and treatment. Nothing will be found advocated in this book that has not been fairly tested in the author's own experience."

The above statement is in evidence of the author's unabated convictions of the correctness of his views, but it does not necessarily force us to share them. We need not deny Dr. Kirkbride's ample experience with the care of the insane and his success with his own methods, while still admitting a doubt whether these methods are the best that can be devised, and whether success would not have been much greater had other plans prevailed. Moreover, in medicine, more than anything else with which we are acquainted, it is difficult to judge correctly of the merits of any plan by its apparent results, especially when the means for a comparison with other methods are wanting. The *post hoc ergo propter hoc* argument is often as valid to uphold the most arrant quackery as it would be in the present case, and, therefore, we do not consider it worthy of the slightest respect. The views advocated here must stand or fall on their intrinsic merits, and we propose to give them a perfectly fair but thorough examination.

The following are the fundamental propositions on which the whole work is based, as we have been able to glean them from the opening chapters: 1. Insanity is, if treated with sufficient promptness and appliances, a curable disease in a great majority of cases (80 per cent., according to Dr. Kirkbride's estimate). 2. It can be best treated in special hospitals adapted for the purpose, and only in such exceptional cases can it be successfully managed out of these that practically all require hospital treatment. 3. It is the better economy to cure insanity by prompt hospital treatment than to neglect it and to allow it to become chronic. 4. It is the duty of the State to provide for the proper custody and treatment of all its insane, and as all classes have a common interest in this question the provisions should be for all alike.

We have endeavored to state these propositions fairly, and, indeed, cannot make any other interpretation of the first eight chapters than that embodied in them. The author states them, in substance, as almost self-evident facts, and covers them with very little verbiage, and practically supports them with no argument. There is no question but that it is better economy to cure insanity than to support it at public expense after it has become incurable, but this is almost the only statement conveyed in them with which we can fully agree. As to the curability of insanity, it is very far from correct or safe to assume that a majority of cases, developed to the extent that they must necessarily be to be admitted to a State hospital, are curable. The safeguards required for the proper committal of such persons, themselves prevent them from reaching the hospitals, as a rule, till after the preliminary stages of the disorder have passed by, and it is already become well-developed insanity. The disease cannot be nipped in the bud by any such appliances, and, therefore, we are of the opinion that the value of these institutions, in this respect, is greatly over-estimated. Their statistics certainly do not exhibit any such success as this. Dr. Kirkbride's own institution has, from its opening in 1841 to 1880, discharged as cured only 3,681 patients (or cases) out of 8,982 admitted, or about 47 per cent.—certainly not a majority. This number would probably be much reduced if readmissions were excluded, for we find, from the same report, that only about 72 per cent. of the admissions were first attacks. Dr. Kirkbride's institution is exceptional in many respects, and we presume that insanity is fully as successfully treated there as it is anywhere in this country, its percentage of recoveries on admissions is better than that of many, indeed, by this showing is far better than that

of the majority of hospitals at the present day, but it does not justify the first proposition given above. We need not follow the argument further; it may be put down that the curability of insanity in State hospitals is not by any means so great as is stated in this work. The second proposition depends somewhat upon the correctness of the first; if it is found by statistics that the hospitals discharge as cured only a minority of those that come to them for treatment, while it is claimed that a majority of cases are curable, then it falls to the ground, for it proves that they do not accomplish the best possible results, and, consequently, that, for some reason or other, they are not the best places for the treatment of insanity. When this can be said of the richest and best equipped, and presumably the best in other respects, such as the institution under the charge of the veteran author of this work, the case is made still stronger against them.

The special hospital function of all public institutions for the insane maintained in this book, has been, we believe, a leading doctrine of the Association of Superintendents, and has been with them the plea for the style of expensive institutions specified in their propositions given in the appendix. Dr. Kirkbride is in this volume only their spokesman and commentator. It is refreshing, therefore, to find occasionally a leading member of that Association taking the opposite ground, like Dr. Hughes in the last number (January, 1881) of his journal, *The Alienist and Neurologist*, where he enunciates a number of different classes of the insane, forming altogether, when we come to consider them, no mean proportion of the whole, who can be equally well or better treated outside of public institutions.

There is, as we have said, no dispute as to the economy of curing the insane rather than allowing them to become chronic charges upon the community. The only question is: How are we to provide for the curable and the incurable cases? Chronic demented and many other cases of chronic insanity who, when in mental health, lived in hovels and cottages, do not require, in our opinion, when insane, to be housed in a palace and surrounded by comforts and appliances that they are unable to appreciate. All they reasonably need is to be cared for humanely and efficiently, to be adequately fed, clothed, warmed and housed, and protected from harm to themselves and from injuring or annoying others. What they need is an asylum, not a hospital, a place where they are well provided for, a due care being taken to supply them with proper medical treatment when required, and suitable care at all times,

not the barbarous quarters and treatment they now too often receive in county poor-houses and jails. The chance of the possible improvement or recovery of many apparently chronic cases must not be lost sight of, but it is not worth while to put them, as a class, on the same plane as recent and hopeful cases. Therefore, the fourth proposition, that provision should be made for all classes alike does not appear to us to be correct; if it is assumed that a portion of the insane require hospital treatment, it need not be so extended as to cover all classes. It is plainly useless to increase the expense of caring for all the insane on the pretense of curing the admittedly incurable, and the notion that it is necessary to equalize the treatment of all classes seems, when we consider how large a proportion are often unable to appreciate the differences, unworthy of consideration. The practical working of this idea is to provide elegant buildings for officials, and, it may be, luxurious quarters for a portion of the insane, leaving another portions in conditions that are too often a disgrace to our boasted civilization and humanity.

But one style of asylum building is discussed in the first part of this volume, and that is the one that is familiar to almost every one who has visited one of these State institutions; there are, thanks perhaps to the influence of this work and the Association whose views it embodies, very few exceptions to the plans recommended here. It is not necessary for us to go into the details of construction here given; the reason for condemnation of the plans is contained in the general remarks on the leading idea of this book, their expense. This has, in some recently built asylums, reached three, four, and even five thousand dollars for each insane inmate for whom they have accommodations, and in the immediate vicinity of these we have such instances as one mentioned by a Massachusetts State official, of the pauper insane sitting naked in straw in a town almshouse, in sight almost of the Danvers palace, one of the most expensive modern asylums on the Kirkbride plan.

If these plans are to be followed, the specifications are well enough, for the most part, and in some particulars they will apply to other plans. But the prevailing monotony of expensive linear hospitals for all classes of the insane alike should be broken in upon, and we are disposed to emphasize this point as we notice the reissue of the present volume. The destruction of a few of these establishments by fires, such as those at St. Joseph, St. Peters, or Danville, ought to teach a lesson that this work cannot

counteract, though they emphasize only a single one of the objections that can be urged against them. We see also, from the report of the superintendent of the St. Joseph Asylum, Dr. Catlett, that in the experience of the authorities of that institution, the temporarily providing for the insane in outlying cottages and buildings has proved a valuable therapeutic measure. The accident of the fire thus doubly points a moral, showing, as it does, not only the disadvantages of the old plan, but also the advantages of the new. Dr. Catlett comes out strongly in his last report as an advocate of the cottage or detached ward system for the chronic and homeless insane.

The second part of the work relates to the organization of State hospitals for the insane, and here also we find abundant opportunity to differ with the author. The whole system of asylum management in this country is, we think, based on wrong principles, and the evidence of this is daily accumulating through State legislative investigations and otherwise. Political appointments and changes, and the irresponsible and absolute power so generally vested in superintendents and boards of trustees, cannot fail to work out disastrous results while human nature is so constituted as we know it to be. We do not mean to infer that men in these positions are necessarily unworthy; we only wish to state, as applied to this question, the well-known truth that it is dangerous to entrust such unlimited power to any man or set of men, a fact that the experience of all the world has long since abundantly demonstrated in other matters. There is no power which one man can exercise over his fellow-men, not even that of military and naval commanders or prison authorities, that is more absolute than that of an asylum physician over those entrusted to his charge. There is no other class of persons in this country since the abolition of Southern slavery that are so legally disqualified for self-defence, and, therefore, of none whose rights the general public should be more justly jealous. And yet there is no class more irresponsible to the general public under the present system of non-oversight in most of the States of our Union than the superintendents who have these unfortunates in their charge. It is only by some irregular and extraordinary method that asylum abuses come to light, some special legislative investigation, or some glaring scandal that cannot be hushed or white-washed, and then it is naturally unfortunate for all parties concerned. How many equally damaging facts to those occasionally exposed, exist and are suppressed can only be inferred from the possibilities.

We cannot better state the present system and its opprotunities for abuses than by a quotation from a recently published essay by Mr. Dorman B. Eaton in the *North American Review*, which contains a large amount of truth very strongly stated. He says, after noticing the extraordinary powers given to the trustees of the lunatic asylum at Utica, N. Y.,—a typical American institution in its organization : “ But the authority of the asylum superintendent is, if possible, more dangerous and unchecked than that of the trustees. He is an autocrat,—absolutely unique in this republic,—supreme and irresistible alike in the domain of medicine, in the domain of business, and in the domain of discipline and punishment. He is the monarch of all he surveys, from the great palace to the hen-coops, from pills to muffs and handcuffs, from music in the parlors to confinement in the prison rooms ; from the hour he receives his prisoner to the hour when his advice restores him to liberty. Here is the almost incredible power given by statute to an asylum superintendent. He assigns all officers and employés to duty. He prescribes all diet and treatment. He appoints (subject to the managers’ approval) as many assistants and attendants as he thinks proper. He prescribes them duties and places. He (subject to the managers’ approval) fixes their compensation. He discharges any of them ‘at his sole discretion.’ He suspends any resident officers. He can give ‘*all orders he may judge best* * * * in every department of labor and expense.’ He is authorized to ‘maintain discipline’ and to ‘enforce obedience’ to all his own orders. He keeps the only required accounts, and the only record of his doings ‘and of the entire business operations of the institution.’ He approves the bills he has contracted. He makes the only report of his own administration. He, too, is the person who gives the permit upon which his prisoners may be restored to liberty.

“ This unparalleled despotism—extending to all conduct, to all hours, to all food, to all medicine, to all conditions of happiness, to all connection with the outer world, to all possibilities of regaining liberty—awaits those whose commitments may easily be unjust if not fraudulent, whose life is shrouded in a secrecy and seclusion unknown beyond the walls of an insane asylum,—is over prisoners the most pitiable of human beings, whose protests and prayers for relief, their keepers declare and many good people believe, no man is bound to respect. When Frederick the Great defined his despotism as one under which he did what he was a mind to and his subjects said what they were a mind to, his sub-

jects were able to speak for themselves and could make their complaints ring through the kingdom. It would be almost incredible that such authority should be conferred upon any officer in this country had not the public for a long time supinely accepted their theories about insanity from asylum superintendents, by whom this statute was so naturally dictated in their own interests. It assumes superintendents to be saints, with whom passion, selfishness, revenge and neglect are impossible."

It is true, Mr. Eaton says a little further on, that, in spite of this vicious system, there have been under it admirable asylum officers, and we think that at the present time a very large majority of the superintendents are far better than could reasonably be hoped for. There are also differences in the laws of different States from that in New York above referred to, but the variations are, in the main, only in degree of badness, not in kind. If we find officers faithful, conscientious, and humane anywhere, we can credit it to their innate moral sense and feeling of responsibility as citizens, not to their environment. The men are better than the system, which many of them honestly but mistakenly uphold. Among these we include Dr. Kirkbride himself, for we cannot ignore his honorable personal record of so many years. The fact also that this despotism exists in a society with which it is altogether incongruous, and that exposure of abuses will be disastrous, is itself no small check on a prudent man, but that it is not always sufficient is demonstrated by facts that are constantly coming to light in different parts of the country.

The volume before us in every respect defends the present system of absolutism on the part of the superintendents. Even the trustees, who have the general supervision of the establishments, must apparently defer to him. Their functions, according to Dr. Kirkbride, seem to be decidedly general, not special, in their character. A few quotations will show the drift of his opinions.

"One of the most important duties connected with the trust of these officers will be the appointment of the physician-in-chief and superintendent of the institution, and, on his nomination and not otherwise, of suitable persons to act as assistant physicians, steward and matron, * * * While giving the strictest attention to their own appropriate functions, they should most carefully refrain from any interference with what is delegated to others, and meddling with the direction of details for which others are responsible. * * * Under no circumstances should a trustee so far forget the proprieties of his station as to resort to subordinates for information that should come from the superintendent," etc.

The proposition of the Superintendents' Association in regard to the functions of the superintendent is quoted and amplified upon, and the present system, in vogue in most of our asylums, which practically makes that official a despotic executive rather than a medical officer, is defended at length. We have already in former numbers of this JOURNAL expressed our views on this subject, and therefore it is not absolutely necessary for us to enter again upon this phase of the subject here. We will, however, say that to our mind the chief function of such an institution is its medical one, and all others are subordinate. A really scientific medical man, who has the proper professional qualifications for the care and treatment of insanity and the proper professional spirit that it necessarily requires, will feel a natural dislike to having all his powers turned in other directions. Dr. Kirkbride is evidently of the opposite opinion, for he says: "The physician-in-chief who voluntarily confines his attention to the mere medical direction of the patients must have a very imperfect appreciation of his true position or of the important trust confided in him. He becomes, in reality, a very secondary kind of an officer, and his functions will be pretty sure to be considered by many around him as quite subordinate in importance to those of some others concerned in the management of the establishment, which, under such an arrangement, can hardly keep permanently a high character."

When we consider how much the medical (and hygienic) direction of the inmates of an insane asylum implies, the above passage does not appear to contain a very large amount of valuable truth. The medical superintendent must necessarily have authority over everything relating to the care of his patients, and as the only reason for the existence of the establishment is to provide for this, especially if we maintain the exclusive hospital function advocated in this work, the superintendent should have the predominant voice in its management. This much may be admitted. But it is none the less a perversion of his functions that he should be made at once steward, bookkeeper, farmer, architect, engineer or overseer of shops, to the exclusion of any part of his proper professional duties.

The medical charge of a great hospital requires a higher and more special grade of talent than is needed to conduct the financial and commissary departments of the concern. If a superintendent voluntarily devotes himself to these latter details exclusively or for the most of his time, the inference is not unjustifiable that he knows what he is best qualified for, and virtually

admits his professional incompetency. If the system of organization of these institutions is such as to force these duties upon him to the extent of depriving him of time for his proper medical oversight of his patients, then it should be condemned, and professional public opinion should be so strong against it as to compel its alteration. A sentiment has grown up in this country, largely due, we think, to the influence of the Superintendents' Association, that administrative ability is the chief requisite in an asylum superintendent, and boards of charities and asylum trustees largely act on this assumption in the choice of these officials. Notwithstanding the fact that many good men obtain positions in spite of this sentiment, its effect is seen in the reactionary and unscientific spirit of the Superintendents' Association, and the general low grade of American psychiatry. This notion also is a main support of the miserable system, which every right-minded person regrets, of political control of these institutions that is in vogue in several States of the Union.

We have said that the medical superintendent of an asylum should have the predominant voice in its management. We do not mean by this that he should be an irresponsible or despotic chief official; there should always be a careful supervision by a competent and upright officer or commission on the part of the State. Dr. Kirkbride's remarks on this point are, in the main, correct; the value of the services of these inspecting officers will depend upon the men, their competency and integrity. We believe, however, that the fear of a poor appointment should not stand in the way of there being such a supervision; the office may be unworthily filled for a time, but public opinion should be and would be sufficiently awake to prevent this being a permanent condition of affairs, after it had once been aroused to a knowledge of the usefulness and need of such inspection. On the other hand, a public opinion that is altogether quiescent on this matter is much less desirable and hopeful. The inspection, as Dr. Kirkbride says, should not be made with the presumption that it is to disclose dishonesty and unfaithfulness, nor should it, on the other hand, assume beforehand that this is necessarily not the case, but it should be vigilantly critical and thorough in all respects, as well as perfectly fair and unprejudiced. Only by such an inspection can the best results be obtained.

The appendix at the close of the work contains the much lauded propositions of the Association of Superintendents of American Institutions for the Insane. We might notice these but

that their objectionable features have already received attention in this review. The association itself, however, deserves a few words. As is well known, and indeed, is indicated in its title, this body is composed exclusively of those who, through political influence or otherwise, have obtained the position of chief officer of an asylum. It is, therefore, not strictly a scientific nor even an orthodox medical society, for by its organization representatives of any school of medical practice that has sufficient political influence, and even non-graduates in medicine may become its members. It is, as Mr. Eaton says in the essay already quoted, "a combination for mutual support and self-defence by a large number of isolated officials," a trades-union rather than a scientific professional association. It has no analogue, so far as we know, in any other country. And to quote again from the same essay, it is self-evident that, "as average human nature is, it was inevitable that an association thus organized should crystallize old methods and abuses and become, in itself, an obstacle to reform."

We say this with the kindest feelings toward the individual members of the association, a majority of whom we believe worthy of membership in a better organization. It is to be hoped that the time will soon come when, instead of this close corporation, there will be only one society that can include not only superintendents but assistant physicians of asylums and all other persons interested in the medical cure of insanity and allied conditions. The beginning of this is, we believe, now to be seen in the recently organized Association for the Protection of the Insane and the Prevention of Insanity, which held its first session last year. The old organization may go on, eating and drinking, and marrying and giving in marriage, as heretofore, but judgment will certainly come, if it continues to be an active obstacle to reform.

We have given as much space as we have to the notice of this book, not so much because of its medical or scientific importance as because the ideas it contains are those that have prevailed so long in this country to the damage, we think, of scientific medicine and of the interests of the insane. We have noticed especially the points in regard to the organization of asylums or hospitals where we differed with the author for this reason. In many of the minor details here discussed we, with every other person who wishes well for the helpless insane, must agree with him. There is not much, however, that is particularly novel

or suggestive in these, and the main features of the work are the ones to which we have made objection. Its republication at the present time, when agitation for reform in these matters is fairly under way, makes its reiteration of the old-time views appear like an attempt to stay the tide of progress and to defeat reform. The methods approved by the Superintendents' Association have had a fair trial now for a generation and their success has not been so great as to justify their continuance without modification. All knowledge of insanity is not confined to that body, as some of its members would have us believe, and the experience of foreign countries would itself suffice to teach us better ways than they have so far led us in.

While advocating reform and change we can give full credit to Dr. Kirkbride and many of his associates for good intentions and perfect honesty of purpose. It is not to be expected that men who have grown up with a system and who have worked under it till they have lost their mental flexibility of youth should be able to see any benefits in a change. Indeed, their conservatism may be of some little service in checking some possibly inconsiderate and ill-advised movements. But there can be no question of the fact that reform is needed and that it will surely be brought to pass.

II.—I. Fever. A study on morbid and normal physiology. By H. C. WOOD, A.M., M.D. Smithsonian contributions to knowledge. J. B. Lippincott & Co., Nov. 1880.

2. Contribution à l'étude des températures périphériques et particulièrement des températures dites cérébrales dans les cas de paralyses d'origine encéphaliques. Par le Dr. HENRI BLAISE. (*Peripheral and the so-called cerebral temperatures in paralyses of cerebral origin.*) Paris, 1880, G. Masson, pp. 275.

1. It is with special interest that we begin this review with one of those *rara aves*, an American contribution based wholly on original research. Dr. Wood is well known as an investigator in the front ranks of his department. A large work from his pen on so important a topic should, hence, not fail to command general attention, especially in the really elegant garb which this possesses. The present volume is a continuation of the author's former publications on heat-stroke and fever. (The latter was reviewed in this JOURNAL, July, 1875.)

In the first chapters he repeats a part of his previous publications. He points out that the essential symptom of fever is the elevated temperature, and shows experimentally that all febrile

symptoms can be produced by augmenting the bodily temperature. His (not very numerous) experiments showed that a temperature of 113° to 117° F. is incompatible with the life of the mammalian brain. He does not claim that all the clinical manifestations in fevers are due to the heat of the body. But it seems to us that not enough stress is placed on the difference between the disorders due to the temperature alone and the accompanying symptoms referable to some other cause. The difference is illustrated especially in the comparison between the aseptic fever of subcutaneous injuries or disinfected wounds and the ordinary surgical fever. As Genzmer and Volkmann have pointed out, the former state is accompanied by scarcely any subjective complaints.

Wood examines hereupon the cause of the rise in temperature. He shows experimentally that the bodily temperature rises when an animal is placed into a chamber of about the temperature of the body, or above, but that the rise is more marked after a high section of the spinal cord. On the other hand, an animal with divided cord will lose in temperature when surrounded by air cooler to any extent than its body. These results are not new; they agree with previous observations.

In order to learn the total amount of heat-production and heat-dissipation under these circumstances, a calorimeter was constructed. According to the test experiments, the apparatus seems quite reliable as long as it possesses about the temperature of the surrounding air. Above or below the degree of the atmosphere its indications are mistrusted by the author himself. A glance at the numerous tables of figures in the volume must convince the reader of the immense amount of work involved, and the faithfulness with which it was executed. The author acknowledges in this connection the valuable aid of his two promising assistants, Drs. Hare and Lautenbach, both now deceased.

By means of the calorimeter it was determined that the amount of heat lost through the skin is considerably augmented for some hours by section of the spinal cord, but that the dissipation of heat subsequently falls below the normal amount.

In these experiments the temperature of the calorimetric chamber was equal to that of the ordinary air. Hence, the animal temperature did not rise under these circumstances. The total amount of heat produced in the body is lessened, probably on account of the depressing effect of the subnormal temperature of the tissues on tissue-change. However, on placing the animals in a warmer chamber, so as to allow their bodies to gain in temperature, the

production of caloric *is* increased. The augmented loss of heat the author attributes to the relaxation of the cutaneous vessels, caused by the section of vaso-motor nerves of the cord. This explanation is logical, and borne out by the observation that the loss of heat increases with height of the section; in other words, with the number of vaso-motor nerves cut off from the centre. Here-upon the author enters upon a long discussion about a *heat-centre*, alleged by Tscheschichin to exist above the medulla oblongata. He still maintains the views announced in his Toner lecture on fever (1875). By severing the medulla oblongata from the pons, the temperature usually rises, even when the air is cool, provided the vaso-motor centre in the medulla is not paralyzed by the injury. The latter point can be decided by the possibility of a reflex rise in the blood-pressure on irritating a sensory nerve. In some instances no fever occurs, although the experiment seems successful in other respects. The cause of these apparent exceptions is revealed by the calorimeter. There is always increased heat-production, but the accumulation of caloric is prevented in such cases by an even greater dissipation of heat through the relaxed vessels of the skin. In rabbits no rise of temperature was ever observed on severing the medulla from the pons, probably on account of the impossibility of avoiding a lesion of the vaso-motor centre in this small animal. In his review of the literature Wood has evidently overlooked the confirmatory experiments of Schreiber reported in *Pflüger's Archiv*. (vol. viii).

Wood assumes, on the strength of his researches, that there exists in the pons, or even higher up in the brain, a centre regulating the production of heat. On severing the tissues from this centre, the heat-production is increased. The centre is, hence, inhibitory. That the increased temperature is not due to irritation of the medulla by the lesion, the author tries to prove by irritation of the medulla with needles. The results were not constant, and the experiments uncertain as they were, were not numerous enough to prove the point.

Heidenhain had previously announced that when a sensitive nerve is stimulated, a fall of temperature occurs simultaneously with the rise of blood-pressure. This result he attributed to a more rapid flow of the blood through the cutaneous vessels. Wood attacks this explanation, but on entirely erroneous physical notions. Moreover, the explanation seems even better justified since the researches of Ostroumoff (in Heidenhain's laboratory), who showed that the cutaneous and internal blood-vessels do not

contract alike on stimulation of sensitive nerves, but that, in fact, the skin becomes hyperæmic by vaso-dilator reflexes. Hence Wood's attack on the view of Heidenhain is not successful. Wood himself attributes the fall of temperature on irritating sensory nerves, to a reflex activity of the alleged heat-inhibitory centre. In order to prove his point, he examined the temperature on irritating sensory nerves after a previous section of the upper part of the medulla. The results were indeed negative, but they do not prove anything, since in his comparative experiments in which the medulla had not been touched, likewise no definite results were obtained. The author attempted to locate the heat-centre more accurately by means of caustic injections into different parts of the brain, but found the method unreliable.

Eulenburg and Landois, as well as Hitzig, have found that destruction of the motor centres in the cerebral cortex causes a rise in the temperature (of the skin) of the other side of the body. Wood repeated these experiments on a large scale, but measured the total heat-production of the body with the colorimeter instead of observing the cutaneous temperature. His results were, that "destruction of the first cerebral convolution in the dog, posterior to and in the vicinity of the sulcus cruciatus, is followed at once by a very decided increase of heat-production, whilst after irritation of the same nervous tract there is a decided decrease of heat-production." The motor centres seem to be irritated by lesions in other parts of the cerebral surface, since in such experiments the production of heat was always reduced. The effects of destruction of motor centres are, however, transitory, probably not lasting over twenty-four hours. The author justly argues that this does not overthrow the existence of these centres, since the paralytic effects on muscular movements and coördination are likewise but transitory in the dog. He supports his position by a very appropriate discussion of the theory of "localization."

In the next place the author claims that the influence of the cerebral centres is not exerted through the vaso-motor nerves, but is due to direct effect upon the tissue change. The experiments he quotes in proof of this view are novel and interesting, but we fail to see how they can justify his conclusions.

He found, in the first place, that the reflex rise of blood-pressure produced by irritation of sensory nerves can still be obtained in the curarized animal after section of the vagi and splanchnic nerves. It is, of course, not great, since the division of the splanchnic nerves lowers the blood-pressure enormously.

The rise which he did obtain, he attributes to reflex contraction of vessels others than those of the abdominal cavity (territory of the splanchnic nerve).

If the contraction of these vessels alone can raise the arterial tension, he argues, irritation or, on the other hand, destruction of motor centre in the cortex would alter the blood-pressure if the cortical centres controlled these vessels. But neither electric stimulation of the cortical centres nor their destruction had any effect upon the blood-pressure (before or after section of the splanchnic nerves). Hence the influence of the cerebral gray substance upon the temperature does not depend on vaso-motor action. But this conclusion is illegitimate. The reflex rise of pressure on stimulating sensory nerves after previous division of the splanchnics is due to contraction of *all* the vessels still connected with the vaso-constrictor centre. Moreover it is not certain that the splanchnic nerves contain *all* the vaso-motor filaments of the abdominal cavity (Asp). In operating on the cortical surface, on the other hand, we evidently do *not* influence all vessels of the body, and contraction or relaxation of a limited number of vessels, for instance, those of one or even several extremities, does not change the general blood-pressure, as can be shown by experimental ligation of vessels. However ingenious Wood's experiments are, they do not prove the point he claims. In fact, the experiments of Eulenburg and Landois show directly that the motor centres (or at least adjoining centres in the hemispheres) control the local circulation in the vicinity of the muscles which they command.

The following chapter is devoted to a discussion of fever.

The more important results of other observers are critically examined. But we miss in this place a reference to some of the most valuable contributions to literature, for instance, the researches of Murri and of Leyden and Fränkel. Wood's own experiments are about half a dozen in number, but bear the stamp of conscientious accuracy. The animals received injections of stale blood or pus and were examined in the calorimeter for several days, many hours or even a whole day at a time. The conclusions may be stated in his words, since they seem to be the natural inferences of the experiments.

"In the pyæmic fever of dogs, the heat-production is usually in excess of the heat-production of fasting days, but less than that which can be produced by high feeding; usually the production of animal heat rises in the febrile state with the temperature and

with the stage of the fever, but sometimes the heat-production becomes very excessive, although the temperature of the body remains near the normal limit. In rabbits with pyæmic fever the heat-production seems to be even greater than it is in health, when food is taken.* Fever is a complex nutritive disturbance in which there is an excessive production of such portion of the bodily heat as is derived from chemical movements in the accumulated material of the organism, the overplus being sometimes less, sometimes more than the loss of heat-production resulting from abstinence from food. The degree of bodily temperature in fever depends, in greater or less measure, upon a disturbance in the natural play between the functions of heat-production and heat-dissipation, and is not an accurate measure of the intensity of the increased chemical movements of the tissues."

In the last chapter Wood discusses the theory of fever. He admits that most fevers, which we observe clinically, are due to the existence of pyrogenic agents in the blood, and that the purely neurotic origin has never been proven in any fever. Still, he thinks it likely that such temporary febrile movement as results from teeth-cutting or intestinal disturbance may be due to nerve irritation. In aid of his view, he points out the increased production of heat and formation of CO_2 , resulting from the application of stimulants to the skin, especially cold.

So far his conclusions are well justified by the facts, but when he claims that the fever-producing agents existing in the blood exert their influence primarily upon the heat-centre, he seems to pass beyond proof. The experiments of Murri, who elevated the temperature by the injection of pyrogenic substances after a high division of the cord, certainly contradict such an exclusive view. Still Wood does not claim absolute paralysis (except in cerebral rheumatism) of his heat-inhibitory centre in fever, but only a state of paresis. He tries to disprove, indeed, the paralysis by reducing the febrile temperature by means of stimulation of sensory nerves. But the experiments are just as inconclusive as similar ones on non-febrile animals referred to above. The tables do not show any immediate or constant depression of temperature from the pain, beyond the usual diminution of the heat in fettered animals, to which Wood does not call attention. Finally, the author explains the role of the vaso-motor system in fever, claiming that it is benumbed so as not to respond readily to the necessity

* The completion of digestion in the rabbits requires a number of days, the alimentary canal being filled even when no food is eaten for several days.

for the dissipation of the excessive heat. Again we must differ from him. Clinical experience as well as experimentation has shown that, during the febrile state the vaso-motor nerves of the skin are really abnormally excitable.

While thus many of the conclusions are not fully supported by the experiments, the book, as a whole, is really one of the most valuable American contributions to experimental pathology. Apart from the original portion, it consists of a thoroughly critical review of literature not easily accessible otherwise. Though the size is not very convenient, the appearance of the work is truly elegant.

2. The French work, above noticed, is of an entirely different character. It, too, contains some original research, purely clinical, but the bulk of the volume consists of a voluminous critical review of literature. The author begins with a history of observations on cerebral and cranial temperature from the earlier researches of A. Davy down to the last statements by Amidon. These results are criticised on the basis of Frank's experiments. By direct test the latter observer found that it requires a change of temperature of at least 3° C. in the cranial cavity in order to obtain any decisive indication by a thermometer applied to the outside of the skull. Since the cerebral tissue conducts heat better than the cranial bones it is physically evident that any differences in temperature of adjoining regions of the scalp cannot be referred to the actual temperature of the brain. The author himself quotes Frank *in extenso*, but does not add anything further himself. If such differences in the temperature of adjoining parts do exist, as has been claimed, they must be accounted for by the variations in the vascularity of the scalp. Blaise has taken the cranial temperature in a number of healthy persons and obtained results comparable to those of his predecessors. He, too, found the frontal region warmer than the parietal, and the occipital coolest of all, there being a difference between the two sides in favor of the left. But the differences, according to Blaise, are very small, his extremes in six instances ranging from 35.75° to 36.75° C. The discrepancies existing between his and the much lower figures of Broca (as low as 33°), he refers to the method. He kept his instruments in contact for 45 minutes. The extreme limits which he admits as occurring in health, may range from 34° to 37° C.

The following chapter contains the record of numerous painstaking observations in various nervous diseases, especially cere-

bral softening and apoplexy. The reward for so much labor, however, was very small, the differences found between the two sides being but very small and by no means constant. More positive results have been obtained by American authors. Gray and Mills have both found elevation of the cranial temperature on the side of a tumor, while Mary Putnam Jacobi has seen a marked increase in heat over spots of tuberculous meningitis. Blaise considers the number of such instances as yet too small for diagnostic conclusions.

In the following part Blaise discusses a more important and practical topic, viz., the course of the temperature in the axilla and the limbs in paralyses. His own researches are always preceded by an excellent résumé of the literature, which alone renders the work valuable for reference.

In *cerebral hemorrhage* three stages have been described by Charcot and Bourneville and confirmed by the author. In the first stage, lasting at the most some three hours, the temperature often sinks several degrees, especially in the limbs, less so in the head. The paralyzed limbs are the cooler, especially at their periphery. During the second stage the axillary temperature remains about normal, oscillating within narrow limits for some hours or days. This stage is absent in very severe cases, in which the cooling is followed at once by a rather sudden rise, lasting rarely beyond one day, and preceding death. The repetition of hemorrhage causes a reappearance of the first stage. During the stationary period there is little or no difference between the two sides as to the temperature.

In *cerebral softening*, on the other hand (from embolism or thrombosis), the stage of falling temperature does not exist. Within a short time the temperature begins to rise, but in a variable manner. Sometimes it rises slowly but steadily; in other instances the elevation is sudden but very transitory. A rapid return to the normal figure is of favorable prognostic significance, while death usually occurs after a steady rise. The temperature is thus an aid in diagnosis between cerebral hemorrhage and embolism. In the latter affection there is but a slight and no constant difference between the two axillæ.

The *post-mortem* rise of temperature is hereupon discussed very fully. The most striking results may be thus summarized: In most cases of apoplexy there occurs a considerable rise after death, especially after cerebral hemorrhage; less so after embolism, unless the territory of the brain implicated was a very large one.

This rise is not noticed when death is the immediate consequence of the hemorrhage. When the apoplexy is due only to congestion the rise is not marked. The *post-mortem* elevation is due to the chemical changes persisting in the tissues until cellular death is complete, while loss of heat is prevented by stoppage of the circulation (in the skin) and the perspiration. The author attributes a share also to the onset of rigor mortis, and to the coagulation of the blood (?).

Finally, Blaise observed the temperature in the limbs in various forms of paralyzes, supplementing his observations by a very full review of the results of physiological experimentation. His own results can be summarized in about the following words: In paralysis of cerebral origin not beginning with apoplexy, the temperature remains about normal, or does not rise much. In hemiplegia the paralyzed side is usually cooler than the normal extremity, though a few exceptions in favor of the paralyzed side can be observed. No absolute distinction was found by the author between recent and old forms. This difference between the two sides is not always permanent; it may increase or diminish. Any difference between the two sides, if it exists, is most marked in the periphery of the limb; much less so at its root (axilla). This is due to the sluggish circulation on the injured side, revealed by the purple coloration of the skin. Hence the more exposed parts are apt to cool more readily.

The presence of contractures did not affect the local temperature. In hemianæsthesia a difference was always found, the anæsthetic side being the cooler, though the difference never surpassed 1° C. This lower temperature co-exists with diminished perspiration and anæmia of the parts. The nature of the cerebral lesion causing the paralysis did not seem to influence the local temperature.

Lastly, the author relates some experiments consisting in the application of sinapisms to paralyzed limbs, showing that the resulting congestion causes the temperature of the skin of that part to rise, as might have been expected. The rise, however, was very slight, but was always accompanied by a phenomenon of transfer, a corresponding reduction in the temperature of the symmetrical part of the other side.

The last chapter contains a detailed and wearisome report of the cases observed. The memoir, as a whole, does not add very much of a positive nature to our knowledge, but this is no fault of the author's. His labor in so many and accurate observations of

clinical cases deserves to be appreciated, even though the results were often negative as far as far-reaching conclusions are concerned. The work, however, contains full information on all the topics discussed. [H. G.]

III.—On certain conditions of nervous derangement, somnambulism, hypnotism, hysteria, hysteroid affections, etc. By WILLIAM A. HAMMOND, M.D. New York : G. P. Putnam's Sons. Chicago : Jansen, McClurg & Co. Pages, 256.

This may be regarded as a new edition of the author's work on "Spiritualism and Other Causes of Nervous Derangement." (1876.) He says :

"A book published in 1876, having for the last two years been out of print, I have taken the opportunity afforded by the demand for a new edition—which would long ago have been complied with but for the stress of other engagements—to thoroughly revise the work, and, while adding largely to the subjects now considered, to make it more homogeneous by omitting everything specially relating to spiritualism."

In the brief preface from which the above extract is taken, he continues :

"The interesting conditions of which the present volume treats are being attentively studied both in this country and in Europe, and ought to be brought to the knowledge of the general reader. They are the fields upon which the miracle-worker expends his most energetic labor ; for he knows something of the forms under which they are manifested, and he also knows that by making adroit use of them he can deceive thousands of innocent but ignorant people to his own advantage, and that of any system which requires miracles for its establishment or aggrandizement. As a knowledge of the conditions in question becomes more diffused, the ability to work miracles will be correspondingly diminished ; and in the hope of contributing to these ends this little book is written."

Such is the account given by the author himself of the origin and design of the present work. It is divided into seven chapters, with titles as follows :

I. Certain Conditions of Nervous Derangement. II. Some Phases of Hysteria. III. Another Phase of Hysteria. IV. The Hysteroid Affections—Catalepsy, Ecstasy, and Hystero-Epilepsy. V. Stigmatization. VI. Supernatural Cures. VII. Some of the Causes which lead to Sensorial Deception and Delusional Beliefs

The portion of the work relating to natural and artificial somnambulism is an interesting collection of cases, but with no very serious, or at least successful attempt to explain the phenomena involved. The author says :

“ Now, after this survey of some of the principal phenomena of natural and artificial somnambulism, are we able to determine in what their condition essentially consists? I am afraid we shall be obliged to answer this question in the negative, and mainly for the reason that with all the study which has been given to the subject, we are not yet sufficiently well acquainted with the normal functions of the nervous system to be in a position to pronounce with definiteness on their aberrations. Nevertheless, the matter is not one of which we are wholly ignorant. We have some important data upon which to base our investigations into the philosophy of the condition in question, and inquiry, even if leading to erroneous results, at least promotes reflection and discussion, and may in time carry us to absolute truth.”

The mind is said by Dr. Hammond to be “ a force developed by nervous action.” He draws a distinction quite commonly made in classifying mental operations, that is, between those of which the subject is conscious and those of which the subject is unconscious. To this latter, according to Dr. Hammond, the phenomena of somnambulism belong. He says :

“ Somnambulism, natural or artificial, appears to be a condition in which consciousness is subordinated to automatism ; the subject performs acts of which there is no complete consciousness, and often none at all. Consequently there is little or no recollection. There is diminished activity of those parts of the nervous system which preside over the faculties of the mind, while those which are capable of acting automatically are unduly exalted in power.

“ The condition is, therefore, analogous to sleep ; for in all sleep there is in reality something of somnambulism. For the higher mental organs, as the sleep is more or less profound, are more or less removed from the sphere of action, leaving to the others the duty of performing such acts as may be required, or even of initiating others not growing out of the immediate wants of the system. If this quiescent state of the brain is accompanied, as it often is in nervous and excitable persons, by an exalted condition of the spinal cord, we have the higher order of somnambulistic phenomena produced, such as walking, or the performance of complex and apparently systematic movements ; if the sleep of

the brain be somewhat less profound, and the spinal cord less excitable, the somnambulistic manifestations do not extend beyond sleep-talking; a still less degree of cerebral inaction and spinal irritability produces simply a restless sleep and a little muttering; and when the sleep is perfectly natural and the nervous system of the individual well balanced, the movements do not extend beyond changing the position of the head and limbs, and turning over in bed.

"But the actions of the spinal cord—which is, I conceive, the organ chiefly controlling the mind in somnambulism—are not always automatic in character, as I have endeavored to show in another place.* The motions of frogs and of some other animals, when deprived of their brains, exhibit a certain amount of intellection or volition. That they are not more extensive is probably due to the fact that all the organs of the senses, except that of touch, have been removed with the brain, and hence the mechanism for coming into relation with the external world is necessarily diminished.

"In profound somnambulism the whole brain is probably in a state of complete sleep, the spinal cord alone being awake. In partial or incomplete somnambulistic conditions, certain of the cerebral ganglia are not entirely inactive, and hence the individual answers questions, exhibits emotions, and is remarkably disposed to be affected by ideas suggested by others. The ability to originate trains of thought exists only in very imperfect somnambulistic states." (P. 30 *et seq.*)

We have made this long extract partly because it contains the author's explanation of the curious phenomena of somnambulism, and partly because it contains several partial, and what we regard as erroneous, statements.

We would, first of all, direct attention to the, to say the least, awkward expression in which it is said "Consciousness is subordinated to automatism." "Consciousness" and "automatism" are here put, in fact and by implication, into unnatural and false relations. *Voluntary action*, not "consciousness," is the natural counterpart of "automatism" in the present case. The statement we have just quoted from Dr. Hammond would seem to imply that automatism necessitates the absence of consciousness or overrides it. But any one who has considered the familiar automatic acts of sneezing and coughing knows better. The somnambulist, even,

*"The Brain not the Sole Organ of Mind."—JOURNAL OF NERVOUS AND MENTAL DISEASE, January, 1876.

is often conscious of what he is doing, and, within certain narrow limits, consciously directs or controls his movements. It is admitted that the contrary seems to be true, as a rule, if we are to judge by the absence of a memory on the part of the somnambulist of what he has been doing.

But it is to the description given of the physiology of somnambulism that we would particularly direct the attention of the reader. Dr. Hammond is correct in saying that somnambulism is "analogous to sleep." It is incomplete sleep, from one point of view. It is true also that the brain, as a whole, is in a "quiescent state" during profound sleep. In dreaming or in somnambulism the brain is asleep only in parts; in parts it is awake; but this is not Dr. Hammond's view. He says (referring to the state in which the brain is during sleep):

"If this quiescent state of the brain is accompanied, as it often is in nervous and excitable persons, by *an exalted condition of the spinal cord*, we have the higher order of somnambulistic phenomena produced, such as walking, or the performance of complex and apparently systematic movements," etc. (p. 33).

Somnambulism depends on "an exalted condition of the spinal cord" while the brain is "quiescent" or in a state of profound rest. The somnambulist is practically in the same condition in which he would be if the brain had been removed, at least so far as the actions performed are concerned. From this view we dissent entirely. In the first place, we do not see by what means, in this case of Dr. Hammond's, the "exalted condition of the spinal cord" is produced. There are just two ways in which such a condition may be brought to pass: either by way of the peripheral (sensitive) nerves, which proceed from all sensitive surfaces and parts of the body to enter the gray matter of the cord and medulla, or by the excitations which enter this same gray matter by the way of fibres which descend from the brain. So far as is known to nerve physiology, there are no other directions from which excitations can come by which the spinal cord can be aroused to activity. Then it must be remembered that the cord is not a self-acting, self-determining mechanism. It must be excited to action, *ab extra*, or it remains inactive. But if the brain is "quiescent," the excitation to activity cannot come from that source. It certainly does not come by the way of the peripheral nerves directly to the cord, without the intervention of the brain. Our own opinion is, that in somnambulism the brain is only in part asleep. Certain portions are awake and in a state of intense activity; and from these

excited regions (its cortex) the stimuli pass along fibre-systems which extend from the cerebral cortex down to the motor mechanisms in the spinal cord, through which, in their turn, the muscles are set in action which produce the motions involved in the acts of the somnambulist. To fully discuss this question, however, would require a statement of the modern doctrine of localization of function in the brain, of the singular peculiarities in blood-supply to the brain, and, besides, at least the statement of certain facts in regard to the mechanism and modes of action of subordinate parts of the nervous system, for which we have no space in the present brief notice. But all that is known would go to make clear that limited parts of the brain may be awake and active, while others are asleep; that certain parts of the brain may be in a condition of hyperæmia, and hence active; while others may be at the same time in a state of relative anæmia, and hence of inactivity, as in sleep; finally, that the acts of the somnambulist imperatively require that the spinal cord must be excited from the brain, and, hence, that it is not in the "quiescent state" asserted by Dr. Hammond.

Dr. Hammond's explanation is not in accord with the facts of somnambulism, nor with those of nerve physiology; in short, it is not correct. The subsequent chapters are very interesting, especially in those parts which are descriptive. From this point of view the book is as exciting as fiction. With the explanations given of the curious phenomena described, we could seldom agree, either as adequate or correct.

In succeeding chapters on "Some Phases of Hysteria" and "Hysteroid Affections" are highly graphic recitals of histories of cases of nervous and emotional excitement under varying circumstances, among others, that which has attended religious revivals.

In describing the demonstrations accompanying some of the revivals of John Wesley, particular mention is made of those which occurred at Everton, in England, in which it is said Mr. Wesley preached from the text, "having a *fear* of godliness, but denying the power thereof." It may not be needless to remark that the text referred to, both in the Bible (2 Tim. iii:5) and in the works of Mr. Wesley (Works, vol. 4, p. 25) reads, "having a *form*," etc.

In a former work of Dr. Hammond the same erroneous quotation is made, and comment is inspired by a transient feeling of wonder that such an error should have continued to escape the eye of so diligent and reverent a student of Bible-lore as is the author of this interesting volume.

Dr. Hammond says that "catalepsy is characterized by the suspension of the understanding and sensibility," etc. (p. 114). This statement is certainly not always correct, if we understand its scope.

We have known a case of catalepsy in which *general* sensibility was abolished (chiefly the pain-sense) and in which the peculiar muscular phenomena were perfect, but in which the sense of hearing was perfectly preserved, and at the end of months when recovery took place the patient was able to recall the principal occurrences about her during the whole period of her illness, and declared that while she appreciated perfectly most things said and done about her, so far as certain of the special senses were concerned, yet she was powerless to control the organs of expression—that is, the muscles.

The remainder of the work is filled with accounts of exceedingly interesting cases of various sorts of nervous and mental disorders and conditions which will greatly interest and instruct the reader.

The work is greatly lacking in discussions of the curious phenomena described. As usual with the productions of Dr. Hammond, the style is agreeable and clear, and, on the whole, the work is as exciting as live fiction.

IV.—The feeling of effort. (Anniversary memoirs of the Boston Society of Natural History) By WILLIAM JAMES, M.D., Assistant Professor of Physiology in Harvard University, Boston, 1880, pages 32.

This is an attempt to work out the physiology of the feeling or sense of effort experienced when a healthy individual executes a muscular act which is purposive, and to the execution of which the individual gives his particular attention. In physiological psychology, but few, if any other questions are of equal importance. Its determination is the most vital single step, perhaps, in the philosophy of perception. On having missed this point completely, depended largely the utter failure of Berkeley and his followers to construct a sound theory of perception.

The more important steps in a history of the advance of the physiological side of the subject are given, and due reference is made to the psychology of volition and consciousness as they are related to muscular action. The author denies that the "feeling of effort" arises out of the mere mental movement (or volition) at the point where nerve-action is initiated. But it arises rather from the resulting muscular contraction, which affects the sensory

nerves of the muscle, which, in turn, convey to the sensorium certain impressions produced on their peripheral ends during the contraction. A sort of sensation is experienced in the mind which refers to the tense muscles engaged in the muscular effort as its source. Of course this position necessitates what may be called a "muscular sense," and if so, the presence of sensory nerves for the muscles. Both these positions are admitted by the author. We have been unable, for a long time past, to see how any other positions could be rationally assumed, in view of the phenomena of voluntary muscular action, and in view of what has been long known or could be inferred in regard to the nerves of the muscles.

The conclusions of this clear and valuable paper, by Dr. James, are as follows :

"1. Muscular effort, properly so called, and mental effort, properly so called, must be distinguished. What is commonly known as 'muscular exertion' is a compound of the two.

"2. The only feelings and ideas connected with muscular motion are feelings and ideas of it *as effected*. Muscular effort proper is a sum of feelings in afferent nerve-tracts, resulting from motion being *effected*.

"3. The pretended feeling of efferent innervation does not exist—the evidence for it, drawn from paralysis of single eye muscles, vanishing when we take the position of the sound eye into account.

"4. The philosophers who have located the human sense of force and spontaneity in the *nexus* between the volition and the muscular contraction, making it thus join the inner and the outer worlds, have gone astray.

"5. The point of application of the volitional effort always lies within the inner world, being an idea or representation of afferent sensations of some sort. From its intrinsic nature or from the presence of other ideas, this representation may spontaneously tend to lapse from vivid and stable consciousness. Mental effort may then accompany its maintenance. That (being once maintained) it should, by the connection between its cerebral seat and other bodily parts, give rise to movements in the so-called voluntary muscles, or in glands, vessels, and viscera, is a subsidiary and secondary matter, with which the psychic effort has nothing immediately to do.

"6. Attention, belief, affirmation, and motor volition are thus four names for an identical process, incidental to the conflict of

ideas alone, the survival of one in spite of the opposition of others.

"7. The surviving idea is invested with a sense of reality which cannot at present be further analyzed.

"8. The question whether, when its survival involves the feeling of effort, this feeling is determined in advance, or absolutely ambiguous and matter of chance as far as all the other data are concerned, is the real question of the freedom of the will, and explains the strange intimateness of the feeling of effort to our personality.

"9. To single out the 'sense of muscular resistance as the 'force-sense' which alone can make us acquainted with the reality of an outward world is an error. We cognize outer reality by every sense. The muscular makes us aware of its hardness and pressure, just as other afferent senses make us aware of its other qualities. If they are too anthropomorphic to be true, so is it also.

"10. The ideational nerve-tracts alone are the seat of the the feeling of mental effort. It involves no discharge downward into tracts connecting them with lower executive centres, though such discharge may follow upon the completion of the nerve-processes to which the effort corresponds."

SHORTER NOTICES.

I. DIE PROVINZIAL-IRREN-, BLINDEN- UND TAUBSTUMMEN-AUSTALTEN DER RHEINPROVINZ, in ihrer Entstehung, Entwicklung und Verfassung. Dargestellt auf grund eines Beschlusses des 26. Rheinischen Provinzial-Landtages, von 3 Mai, 1879. Mit 48 in den Text gedruckten Holzschnitten. Düsseldorf, 1880.

II. A PRACTICAL TREATISE ON DISEASES OF THE SKIN. By Louis A. Duhring, M.D. Second edition, revised and enlarged. Philadelphia: J. B. Lippincott & Co., 1881. Chicago: Jansen, McClurg & Co.

III. MEDICAL DIAGNOSIS, WITH SPECIAL REFERENCE TO PRACTICAL MEDICINE. A Guide to the Knowledge and Discrimination of Diseases. By J. M. DaCosta, M.D. Illustrated with engravings on wood. Fifth edition, revised. Philadelphia: J. B. Lippincott & Co., 1881. Chicago: Jansen, McClurg & Co.

IV. FOOD FOR THE INVALID, THE CONVALESCENT, THE DYSPEPTIC AND THE GOUTY. By J. Milner Fothergill, M.D.,

Edinburgh, and Horatio C. Wood, M.D. New York : Macmillan & Co., 1880. Chicago : Jansen, McClurg & Co.

V. A PRACTICAL TREATISE ON THE MEDICAL AND SURGICAL USES OF ELECTRICITY ; including Localized and General Faradization ; Localized and Central Galvanization ; Electrolysis and Galvano-Cautery. By Geo. M. Beard, A.M., M.D., and A. D. Rockwell, A.M., M.D. Third edition. Revised by A. D. Rockwell, M.D. New York : Wm. Wood & Co., 1881. Chicago : W. T. Keener.

VI. DISEASES OF THE PHARYNX, LARYNX AND TRACHEA. By Morell Mackenzie, M.D., London. New York : Wm. Wood & Co., 1880. Chicago : W. T. Keener.

VII. A PRACTICAL TREATISE ON NASAL CATARRH. By Beverly Robinson, A.M., M.D., (Paris). New York : Wm. Wood & Co., 1880. Chicago : W. T. Keener.

VIII. MINOR SURGICAL GYNECOLOGY. A Manual of Uterine Diagnosis and the lesser Technicalities of Gynecological Practice, for the use of the advanced Student and general Practitioner. By Paul F. Mundé, M.D. New York : Wm. Wood & Co., 1880. Chicago : W. T. Keener.

I. This is an elaborate general report of the insane, blind, and deaf and dumb establishments of West Prussia, published by authority of a resolution of the Rhenish Provincial Landtag, at its 26th session in 1879. The first and by far the largest portion of the volume is devoted to the description of the five provincial asylums at Grafenberg, Bonn, Andernach, Düren and Merzig. It commences with a historical sketch of the care of the insane in the Rhine Province, from the foundation of the provincial asylum at Sugburg to its closure as a receiving hospital in 1878, from the pen of Dr. Nasse, director of the new establishment at Andernach. This is interesting as showing the growth and movement of the insane population of that territory.

The second section, of over one hundred and forty pages, gives a description of the five new asylums, their construction, architecture, material, water supply, heating, ventilation, sewerage, lighting, etc., in quite complete detail, and is illustrated by numerous diagrams and plans. After this come the descriptions and reports of four of the establishments by their directors or superintendents, Dr. Nasse reporting for Andernach, Dr. Pelman for Grafenberg, Dr. Ripping for Düren, and Dr. Noetel for Merzig. Though brief, they afford a very fair idea of the management of the different institutions and indicate, so far as can be seen, on the whole, a scientific treatment of the insane. We cannot say, however,

that the classification here given is altogether any better than that of the majority of American asylum reports. Where the subject is mentioned at all, the disuse of mechanical restraint seems to be the rule.

The third section gives the financial statements as to the cost of administration of the asylums, the expense of each single inmate, etc. Naturally we expect to find these figures less than the corresponding ones in this country, and are not disappointed. The annual cost per patient of the lower class in these four asylums ranges from about one hundred and twenty-eight to one hundred and seventy dollars, the amount being reduced as the number cared for is increased.

The volume concludes with similar accounts and figures of the institutions for the blind and for the deaf and dumb in the Rhine Province, as were given of the establishments for the insane. Taken altogether it affords a very excellent means for the comparison, in very many respects, of the method employed in Germany and those in use in this country. In this light it deserves a longer notice than we are able to give it here. We may, and indeed, expect to have occasion to refer to it in another review in a future number of this JOURNAL.

II. We expressed our opinion of this work, on the appearance of its first edition several years since, that it was about the best manual of the kind in our language. We see no reason to modify this opinion now, except to say that in its present form it is even better than before. As to the changes that have been made in this new edition, we cannot better inform our readers than by quoting the author's preface. Says Dr. Duhring: "The present edition has been thoroughly and carefully revised, many chapters having been entirely rewritten. It is also considerably enlarged, to the extent of about one hundred pages, the type being somewhat smaller than in the first edition. New matter has been liberally added, and will be found upon almost every page, together with critical remarks where such seem to be called for. The effort has been faithfully made throughout the volume to present the subject in the light of the latest dermatological researches. The forward strides of dermatology within the past few years have been remarkable. No specialty of medicine has grown so rapidly. Formerly a decade comprised comparatively few important discoveries, but now each year adds materially to our fund of knowledge. Frequently revised editions of works on diseases of the skin, therefore, are demanded.

"The chapter on the anatomy of the skin has been largely rewritten, and two new illustrations have been added, one showing the general anatomy of the integument, the other the minute structure of the epidermis. Both were drawn by Dr. Van Harlingen. Considerable matter pertaining to the physiology of the skin has also been incorporated with this chapter.

"The new articles are *uridrosis*, *phosphorescent sweat*, *urticaria pigmentosa*, *dermatitis circumscripta herpetiformis*, *impetigo herpetiformis*, *pityriasis maculata et circinata*, *dermatitis exfoliativa*, *dermatitis medica-mentosa*, *dermatitis gangrænosa*, *dermatitis papillaris capillitii*, *fungoid neoplasmata*, *tuberculosis cutis*, *podelcoma*, *ainhum*, *perforating ulcer of the foot*, and *myoma cutis*.

"Among the chapters which have been enlarged and to which important editions have been made, I may specially refer to *dysidrosis* and *pompholyx*, *hæmatidrosis*, *scleroderma*, *morphæa*, *atrophia cutis*, *hypertrophy of the hair*, *scrofuloderma*, *syphiloderma* and *carcinoma*."

It will be seen from the above that the book is not a mere reprint, but is really an improved and revised edition of what was before an excellent work. We repeat that we know of none better of its kind.

III. This fifth edition of the well known work of Da Costa on medical diagnosis is likely to continue in the favor it has so far enjoyed. As a students' manual of diagnosis, it is conveniently arranged and clearly and pleasantly written and tolerably complete. The changes in the present edition are principally in the chapters on the diagnosis of diseases of the nervous system and of the blood. In the first of these the author has embodied the results of recent clinical and pathological researches to a considerable extent, and yet there are many points in which it is open to criticism. Thus the space given to the diagnosis of certain conditions denominated here "softening of the brain" does not impress us favorably and appears, indeed, ancient and unscientific, at least in the nomenclature of nervous diseases. There may be, and probably is a condition that may be properly called softening of the brain apart from other recognized pathological species, but it must be extremely rare, and probably not easily diagnosed from directly opposite physical conditions. The term, as popularly used, however, and to some extent as used here in this work, is a misnomer, and the space given it, together with a few other defects that we need not notice, detracts somewhat from our estimate of the scientific value of this section. Apart from

these, however, and, indeed, we may say in general, the work is a good one and likely to be of value to the student and practitioner. The present edition is a decided advance on the preceding ones.

IV. This little book, if it carries out the idea of its projectors, is likely to be profitable to authors and publishers. The "fertile brain of Dr. Fothergill" has a thrifty practical turn, and the device of a book that could be prescribed like a dose of medicine, the prescriber ticking off the special diet list for his patient, as he would the items on a wash bill, is not a bad one from this point of view. It is a little surprising that the idea was not struck out long before. Dr. Fothergill's American associate's work is not nearly so conspicuous in this volume. Besides the introductory remarks, which are admitted by the former, the receipts themselves have very largely an English aspect. The book will be none the less useful, however, on this account, if it adds anything to the culinary resources of the native housekeeper. We can easily see how it can be very serviceable to the physician and his patients, and expect it to have a large circulation.

V. This third edition of Beard and Rockwell's "Medical Electricity" calls for only a short notice. We have already expressed an opinion in regard to the work in a former number of this JOURNAL, and the present edition does not differ sufficiently from the former one to materially change our views. We will only say that it contains, on the whole, about as much information on the subject of electro-therapeutics as any work in our language, and the discriminating and intelligent reader will find it often useful and suggestive.

VI. This is an excellent work, and one of the best issues of Wood's library for 1880. The ideas are good, the style clear, and the illustrations numerous and helpful. It is well worthy a place in any physician's library.

VII. This is a pretty fair practical treatise on a limited subject. Nasal catarrh in its various forms is so frequent and troublesome a complaint that such a book as this, if of any merit whatever, is likely to be useful. It is very neatly gotten up, well printed, and quite fully illustrated.

VIII. This work is intended for the general practitioner, not for the specialist in gynecology, and it will fulfil the purpose for which it was written. The physician who follows it will be able to act the more intelligently in many cases, but he is not much more independent of the consulting or operating gynecologist for

the information it conveys. It does not represent the most advanced ideas in the specialty; many of the appliances here described and figured, with more or less of approval or lack of condemnation, are, or ought to be, obsolete in any well regulated practice.

The book will be a useful one, we do not doubt, but it is hardly a fair representation of many things in its department of medical science, and we wish it were a better one.

Editorial Department.

IN preceding numbers of this JOURNAL we have repeatedly taken occasion to speak favorably and hopefully of the Association for the Protection of the Insane and the Prevention of Insanity as a timely and needed organization. We wish here to express our opinion as to the work which that association must accomplish if it is to fulfil the expectations of the friends of reform. That it will do good we do not doubt. There is no fear, as at present constituted, of its becoming a reactionary agency, like the Superintendents' Association. Its simple existence is a protest against the policy that has controlled that body. But it may act far below its possibilities and even be deservedly damned for its sins of omission, if, through the inaction of its members or wrong counsels, it should fail to do its whole duty. The work it was founded to accomplish is more than sufficient to absorb all its energies, and there should be no abatement in its activity as long as it is still unfinished. Its principal points for attack in the present systems and conditions are, in our opinion, as follows :

First, the association should make a vigorous movement on the present systems of practical irresponsibility of asylum authorities in most of the States of the Union. The Association of Superintendents has so long and persistently promulgated the notion that in its members is embodied all the wisdom and information worth having in this country on the subject of insanity, that the public has practically accepted it as a fact, and the result is, that there are no possibilities of despotism greater than those

of a lunatic asylum at the present time. It will need some very steady and, perhaps, at first apparently fruitless labor to bring about reform in this matter, but there is no other way in which it is more certain to be finally achieved.

Secondly, the association should make an earnest effort against the political control of the care of the insane. This can only be reformed by educating public sentiment. Appointments must necessarily be in the hands of public officials, and will be influenced by political considerations, unless the moral sense of the community is strongly against such perversion of a public trust. This is a much more difficult task than the other already mentioned, but this association can very materially assist in bringing about this desired result.

These are the first two objects that should engage the attention of the association, and with them once gained the rest of its work will be comparatively easy, and it will have accomplished enough to justify the highest expectations of its friends. With proper supervision by competent inspectors, and freedom from political appointments and control, the remaining questions of the proper scientific treatment of the insane, the use and abuse of restraint, the functions of the officers, and all the needed reforms, will be matters very easily dealt with. We do not mean to say that these are not subjects that should also engage the association from the first. But assaults on the present order should be made along the whole line, for the victory will never be obtained until the two great evils—the main supports and originators of abuses,—the irresponsibility of officials, and political patronage, are done away with.

To bring about the reforms needed, the association will have to be more than a mere debating society ; it must act as well as talk. It should agitate, educate public opinion, petition legislatures, and attack abuses wherever they are to be found. Differences of individual opinion on minor matters should not interfere with the progress of the good work on the greater ones, and if there is any attempt or tendency to obstruct it in these it should not be compromised with in the slightest degree. Principles, not men,

must be the ruling idea, and personal feeling must not stand in the way of the interests of reform. We mention this because it is readily to be seen how possible it is, in this matter, through a kindly spirit to individuals, to perpetuate a wrong against a class.

We offer these remarks, not as doubting the association, for we have full faith in its good intent, but simply to state our own views as to its functions. We shall watch its progress and movements with great interest, and this JOURNAL will give it its cordial support in every movement for reform.

WE have received the prospectus of a new French journal on nerve and mental diseases, the first number of which, it is announced, will appear in Paris, the 25th of March. The title is as follows: *L' Encéphale. Journal des Maladies Mentales et Nerveuses*, sous la direction de MM. B. Ball and J. Luys, aided by Ernest Chambard.

It has thus borrowed the title of *Brain*, published in London, as the projectors of this new journal admit. Its editors declare that, with similar journals established in America, England, Germany, and Italy, it is time for France to rouse herself, and take a more active part in furthering the progress of neurological medicine in establishing and maintaining live journals in that department. The editors proclaim that its characteristics will be impartiality, a practical spirit, and scepticism. It is to adhere to facts and avoid speculation.

The plan is certainly good, and the names of its accomplished editors are guarantees that the new journal will be conducted with ability and in the best interest of medicine.

WE are in receipt of a communication from Dr. H. Schuele, the Medical Director of the Asylum of Illenau, in which reference is made to the foot-note on page 36 of the January number of this JOURNAL, accompanying the article contributed by Dr. E. C. Spitzka, of New York. Dr. Schuele states that his views on the relation of cortical malformation to certain forms of insanity were laid down in the manuscript of his hand-book as early as 1877,

and appeared in print in the first half of the year 1878. He adds that it is, therefore, evident that they appeared at least independently of Dr. Spitzka's publications, and perhaps even before the latter.

The concluding surmise would be incorrect. The brief provisional statement to which Dr. Spitzka refers will be found on page 161 of the number of this JOURNAL for January, 1878, and nothing could have been published much earlier than that date in the same year. The writer of the letter seems to us to have misinterpreted the drift of Dr. Spitzka's foot-note to some extent. A careful perusal has convinced us that but one inference was intended to be or can be drawn from the foot-note in question: namely, that Dr. Spitzka claims the view as original with himself, and as formed independently of any other source, with the exceptions specified. It does not convey any insinuation that his views have been adopted by others. From a perfectly impartial standpoint, and in view of the almost simultaneous appearance of the statements published by Drs. Schuele and Spitzka, it seems to us that neither can be held to quote his own views from the other. This appears to us to have been the position of Dr. Spitzka, taken by him in the aforesaid foot-note. His manuscript was certainly in the hands of our printers in the latter part of the year 1877.

Dr. Schuele further protests against Dr. Spitzka's statement: "The first observations on cortical malformation with the insane of this class, as well as certain imbeciles, were made by Jessen in 1875, and on these Schuele seems to have based his views." He states that, on the contrary, they are based on his own observations, dating back as far as 1863. We are not able to comment on this aspect of the question, but give space to Dr. Schuele's declaration. He does not state that his own observations were published at any time prior to the appearance of his handbook, and, as far as the date of publication is concerned, Jessen's cases were certainly the first brought to the attention of the profession. Whether Dr. Spitzka's surmise had any basis or not we cannot say, and have submitted the letter to him in order that any doubt on the matter may be cleared up.

Dr. ISAAC RAY, one of the great lights of American forensic psychiatry, has passed away. Dr. Ray, who was widely and favorably known as the author of the "Medical Jurisprudence of Insanity," died at his residence in Philadelphia, having reached the very mature age of seventy-five. He was one of the earliest physicians in the United States to follow the example of Rush, and pay special attention to the subject of psychiatry. Dr. Ray did not enter the specialty a full-fledged alienist, but, after some time spent in the general practice of his profession, was appointed, in 1841, to the medical superintendency of the Maine Hospital for the Insane. He took an active part in stamping on that institution the peculiar system of management afterward adopted as the policy of the Association of Medical Superintendents of the Institutions for the Insane. Of this organization Dr. Ray was one of the original thirteen members, and contributed much, if not most, of its really scientific work. Soon after Dr. Ray's superintendency of the Maine Asylum had begun, he was offered and accepted the superintendency of the Butler Hospital, at Providence, Rhode Island. The hospital was opened for the reception of patients in 1847, and of it Dr. Ray continued superintendent until 1867, when he settled in Philadelphia to engage in the private practice of his specialty, and remained a resident of that city till his death, which occurred March 31, 1881. He was a very voluminous writer, and, as the *Journal of Mental Science* correctly remarked concerning one of his articles, all his writings were marked by clear good sense. His style was pleasant and agreeable, and his work on "Mental Pathology" can be read by almost any cultivated layman with pleasure.

An article of his in the January, 1878, number of this JOURNAL, on the "Cost of Construction of Asylums for the Insane," while upholding the association theory of asylum construction, was a practical, sensible protest against the extravagances to which that theory had carried superintendents. Dr. Ray was by nature exceedingly conservative, and clung with great tenacity and honesty of purpose to the theories of asylum construction and management prevalent in his early medical life. To the association of

which he was one of the founders he was strongly devoted, and regarded with suspicion any attack on it as being an attack on the best interests of the insane. Aside from this narrowness respecting asylum management and control, easily explicable in one who had grown up under a specified system, Dr. Ray was a man of broad scientific views, holding pronounced opinions as to the existence of monomania, moral insanity, and mania transitoria, and on certain points in forensic psychiatry, in which he was fully abreast of the most advanced European psychiatrists. He was one of the best exemplars of the old school of asylum superintendents,—men somewhat inclined to conservatism, but having regard to the scientific branches of their specialty. He was a man of spotless integrity, and capable of forming firm attachments. His *opus magnum*, the “Medical Jurisprudence of Insanity,” will long remain a standard authority on forensic psychiatry, and will be long admired for the purity of its diction. In it he has a most enduring monument.

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

VASO-DILATORS IN THE SYMPATHETIC.—At the session of the Soc. de Biologie December 11 (rep. in *Gaz. des Hôpitaux*), M. Onimus stated that he had not heretofore intervened in the discussion between MM. Dastre and Morat and Laffont, only because he was convinced that these authors would be obliged to admit finally the explanations given by M. Legros and himself in 1865. It was almost by a *reductio ad absurdum* that they had been led to propose and sustain the theory of the autonomous contraction of the vessels. Before 1867 there was only the notion of paralysis of the vaso-motors in case of augmentation, and of their excitation in case of ischæmia. To-day it is admitted that excitation of the nerves causes congestion ; the only difference of opinion is in regard to the explanation of these phenomena. Claude Bernard at first admitted a direct dilatation of the vessels, but soon renounced this opinion as not justified by anatomy. Then the theory of reflex paralysis was proposed. MM. Legros and Onimus have shown that the phenomena produced by excitation are not the same as those that cause the paralysis, and that, consequently, there could be no reflex neuro-paralytic hyperæmia. Moreover, said he, the experiments of MM. Dastre and Morat have confirmed this. We have varied our experiments in different ways, and have shown that by exciting moderately the sympathetic fibres a considerable hyperæmia is always produced, much greater than passive hyperæmia. We have therefore proved an active direct congestion, which is the same thing as direct vascular dilatation, only differing in that this last expression infers the existence of vaso-dilator nerves.

There is to-day no possible difference of opinion in this regard.

This fundamental fact seems well established, and MM. Dastre and Morat have proved it in an incontestable manner ; the dilatation is direct, that is, there is no intervention of any reflex paralytic influence in these phenomena.

This much admitted, and active dilatation being possible neither anatomically nor physiologically, we see only one possible explanation ; it is dilatation by the autonomous movements of the vessels themselves. There are, then, no vaso-dilator nerves, properly so called, but there is an increased sanguine afflux on account of the increased peristaltic action of the vessels.

All observers who have watched the circulation through the microscope at the commencement of an inflammation, have observed alternate contractions and dilatations of the capillaries. On the other hand, we should especially remark that a healthy muscle not only contracts energetically, but is easily relaxed after contraction, while a muscle in an abnormal condition never relaxes completely, but remains always slightly contracted. However it may be in all the muscular tubes, we see perfectly well a dilatation following after contraction, and this dilatation is always more pronounced than that which exists in the condition of repose. This normal relaxation not only permits the arterial tension to dilate the vascular tube and permit a larger amount of blood to enter it, but it also makes it possible to utilize all the force of the heart, since it does not receive its impulse like the elastic tissues of the great trunks and cause retardation. It opposes no obstacle, renders necessary no expenditure of power ; the contraction directly following the relaxation is itself a reinforcing impulse for the propulsion of the blood. I am persuaded that no theory can explain as well as this one the physiological and especially the pathological facts.

MM. Dastre and Morat reply to M. Onimus in the *Gaz. des Hôpitaux*, No. 10, January 25. First, they claim to have established satisfactorily the fact of direct vascular dilatation of the bucco-labial region from irritation of the cervical sympathetic ; a fact admitted, indeed, by M. Onimus. Their interpretation of the fact only had been questioned by him. A vaso-dilator nerve is one, according to any reasonable definition, that, being excited, causes a direct vascular dilatation. There is, therefore, no question of interpretation about it ; it is merely a statement of a fact.

Vulpian and Claude Bernard have shown that there are for the

tongue and submaxillary gland two orders of nerves, anatomically distinct and following different tracks—the constrictors in the hypoglossal and sympathetic, the dilators in the lingual and chorda tympani. MM. Dastre and Morat claim that their experiments show that instead of its being necessary for these two orders to be separated from each other in different nerve-trunks belonging to separate morphological systems (cerebro-spinal and sympathetic), they may be united in the same trunk in the sympathetic. But this is not admitting that they cease to be distinct. The same excitation of the cervical sympathetic that causes simultaneous pallor of the tongue and reddening of the lip, distinguishes physiologically, so to speak, in this complex trunk, the special elements contained, and reveals their different actions—constrictive for the tongue and dilator for the lips. The cervical filaments for each special region always act in the same way, and alternately in both ways, as M. Onimus presumes.

Not only is it the case, as in the cervical sympathetic, that vaso-motor nerves of opposite functions may exist in the same general nerve-trunk for different regions, but it may contain both vaso-constrictors and vaso-dilators for the same regions. The excitation of such a nerve-trunk will give rise to a resultant action, which will be vaso-dilator or vaso-constrictor according as one or the other is predominant, and it is conceivable that there might be voluntarily either a constriction or a dilatation. But it is unreasonable to conclude that the component elements of such a mixed nerve possess alternately both kinds of activity. At least this is the opinion of MM. Dastre and Morat in reply to M. Onimus.

THE REFLEX OF SNELLEN.—At the session of the Soc. de Biologie, of January 29th (rep. in *Le Progrès Médical*), MM. Dastre and Morat reported further experiments on the sympathetic vaso-dilator nerves. The auriculo-cervical nerve is very easily reached in the dog, the rabbit and the goat, when we displace the external portion of the ear. Its section and excitation of its peripheral portion give rise to phenomenon that have been often studied. The excitation of its central portion gives rise to what is known as the reflex of Snellen. When the excitation is strong (Rouget) this phenomenon consists in a congestion of the corresponding ear, remarkable from its intensity and its unilaterality.

This vaso-dilatation is reflex, since the nerve excited is no longer in connection with the spinal cord. MM. Dastre and Morat have

discovered the route of this reflex, its centripetal route, its central track in the cord, and its centrifugal course. 1. The centripetal route, which conducts the excitation to the cervical cord, is formed by the second pair of spinal nerves which give out the auriculo-cervical. 2. Experiment demonstrates that the excitation follows in the cord a descending track, leaving it below the seventh cervical pair of nerves. Indeed, if we cut the cervical cord anywhere between the third and seventh pairs of nerves, the reflex is destroyed. If only hemisection is done, the reflex is abolished on the corresponding side. It is certain, therefore, that the excitation finds the nervous centre for the reflex vascular dilatation below the seventh cervical vertebra. 3. The excitation leaves the cord by way of the rami communicantes, which leave the last cervical pair to pass to the lower cervical and first thoracic ganglia. When these filaments are cut the reflex is abolished, and when the end attached to the ganglion is irritated it reappears.

These rami communicantes are, therefore, veritable vaso-dilator nerves for the ear, and the portion of the cervical cord which transmits to them the excitation contains the vaso-dilator centre for the ear.

In Snellen's experiment this centre is put in action by exciting the central end of the auriculo-cervical nerve. It may be put in action by all other excitations that reach it. Among these excitations, MM. Mathias Duval and Laborde have noticed those which, made on the trigeminus, are conducted directly by the roots of this nerve (ashy tubercle of Rolando) to the vaso-dilator centre described by MM. Dastre and Morat. Arrived at the first thoracic and lower cervical ganglion, these auricular vaso-dilator fibres terminate, or rather they continue their route in the cervical sympathetic, mixed with vaso-constrictor fibres known to exist there, and with these gain the vessels of the ear. In the first case the ganglia of the sympathetic chain will be, like the peripheral ganglia, centres of reaction or of interference of the two kinds of nerves, one upon the other.

However it may be, the vascular innervation of the ear is now known. The auricular dilators and constrictors have distinct origins in the cord; there is a cervical vaso-dilator centre and a thoracic vaso-constrictor centre. Both classes of nerves have an equal title to the name sympathetic, which is only a new instance, in particular, of the general law formulated by MM. Dastre and Morat, viz.: "The great sympathetic is a mixed or double system containing vaso-dilator and vaso-constrictor nerves for all the organs."

THE EXCITABILITY OF THE MOTOR NERVES.—At the session of the Société de Biologie, December 18 (rep. in *Le Progrès Médical*), a communication by M. Marcacci was read. In studying the character of the reflex impulse produced by the excitation of a motor nerve in connection with the cord, M. Maracacci observed a new fact of interest as regards the question of the excitability of the motor nerves. The following is the experiment :

Opening the spinal canal of a frog, he cut all the roots, motor and sensory, on one side, reserving only one pair (motor root and sensory root). Placing the excitor on the motor root, it is irritated by an induction discharge, the minimum current that will produce a muscular contraction at the opening being found.

This having been done, the sensory root is then cut, and the irritation again made. Now the current that was before too feeble to produce any effect, produces an energetic contraction ; the minimum current of before becomes a powerful excitant in this new condition. The section of the sensory root apparently increases considerably the excitability of the motor root.

CEREBRAL THERMOMETRY.—Dr. R. W. Amidon notices, *N. Y. Med. Record*, Dec. 25th, the criticisms by Franck on the experiments in cerebral thermometry, and gives the results of further investigations on the subject by himself. He repeated Franck's experiments with greater precautions against error. Using the freshly prepared cranium, with scalp attached, brought up to a temperature of 95.5° F., he injected warm water directly against the inner surface of the cranium, the thermometer being applied to the shaven scalp outside. The results of these experiments, one of which, performed in the presence of Drs. Seguin, Putnam-Jacobi, A. B. Ball, and W. R. Birdsall, is given in detail, appears to demonstrate the following facts :

1. "That heat can be transmitted through the dead human cerebral envelopes in very appreciable quantities.

2. "That it is better transmitted when the envelopes are themselves warmed to more nearly simulate the living textures.

3. "That the rise of temperature commences externally in from four to eight minutes after the internal elevation, and attains its maximum in eight to twelve minutes, and that the fall of the two temperatures pursues the same course.

4. "The average of eighty temperatures taken shows a ratio of the internal temperatures to the external of 2:1.

"This ratio is much diminished when the media are warmed,

hence it is natural to suppose that in the warm, living state the ratio would be smaller still."

Dr Amidon next takes up the exceptions that had been made to his experiments on cerebral thermometry, in connection with willed muscular movements, and gives details of an experiment performed by him in the presence of Drs. T. A. McBride and W. H. Halsted, which bore out his former statements. He says :

"In experiments properly performed I have found the invariable results :

1st. "That within the first two minutes a fall of temperature takes place on the same side of the head as the muscular movements.

2d. "That this fall continues during the succeeding four or five minutes, and may attain the amount of 1° F.

3d. "That at the end of the sixth or seventh minute it begins to rise, and at the eighth to the fifteenth minute will regain its old position, and even, perhaps, a slightly higher one.

4th. "That the temperature on the side of the head opposite the muscular movements sometimes slightly falls at first, but on or before the fifth or sixth minute begins to rise, and finally attains a temperature $\frac{1}{4}^{\circ}$ to 1° F higher than it started with.

"These results are deduced from an immense number of observations, and must be explained as each one sees fit. I myself adduce no theory to explain them. One thing, however, I will say, and that is, if this rise of temperature is produced by cerebral activity (and the time of the commencement of the rise of temperature, after the movements commence, is identical with the time consumed by the heat of water to traverse the cerebral envelopes), the ultimate rise of temperature on the same side may be caused by diffuse radiation from the opposite side—the brain, as is well known, being a good conductor of heat.

"A final word as to the cautions to be exercised to make an experiment succeed :

1. "The subject should be strong.
 2. "The movements *must be* vigorous.
 3. "The hair must be thin or short.
 4. "The temperature of the room low (56° to 60° F., 12.5° to 16° C.) and equable."
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THE REFLEX CONNECTIONS BETWEEN THE LUNGS, HEART AND BLOOD-VESSELS.—Preliminary communication by Prof. Dr. Sommerbrodt, of Breslau, in the *Centralblatt f. d. Med. Wissensch.*, 1880, No. 49.

1. Every increase of intrabronchial blood pressure in man (loud speech, singing, coughing, running, climbing, compressed air, etc.), causes irritation of the sensory nerve of the lungs.

2. Hence follows (*a*) depressive reflex action on the vasomotors (diminution of vascular tonus, dilatation of the blood-channels, lowering of the blood pressure); (*b*) depressive reflex action on the inhibitory nerves of the heart (acceleration of the heart's action).

(*a*) and (*b*) increase the speed of the blood current, and with it also the secretion of urine.

3. The utility of this combination of reflexes is :

(*a*) Compensation of the hindrance to the circulation, the venous stasis, due to increased intrabronchial pressure.

(*b*) The securing of increased supply of oxygen and formative material to meet the more pronounced waste from action of the muscles (in singing, etc.), and probably also of the central organs (speaking).

The intrabronchial pressure is thus, through the intermeditation of the sensory nerves of the lungs, the regulator of the rapidity of the circulation.

4. Irritation of the sensory nerves of the lungs may also, with the action of 2, (*a*) and (*b*), under certain conditions (probably increased irritability of the heart), in a reflex way alter the cardiac rhythm.

5. The retardation and alteration of the rhythm of the heart found with increased arterial blood pressure by Knoll in experiments on animals, can also be experimentally produced in healthy human beings.

The following are a few of the recently published articles on the anatomy and physiology of the nervous system :

HOLMGREN, Subjective Color-Sensations in the Color-blind. *Centralbl. f. d. Med. Wissenschaft*, Nos. 49 and 50, 1880. OTT, The Inhibition of Sensibility and Motion. *N.Y. Med. Journ.*, Jan. CLEVINGER, Central Anatomy Simplified. *Chicago Med. Journ. & Exam.*, Nov. COLE, Conjecture on Tactile Sensibility. *St. Louis Med. & Surg. Journ.*, Feb., 1881. SPITZKA, Further Notes on the Brain of the Iguäna and other Sauropsida. *Science*, Feb. 19th. BUFALIM, On the Preparation of the Cylinder Axis of the Nerve-Fibre. *Lo Sperimentale*, Nov., 1880. SKENE, Studies of the Relations Existing between the Organs of Reproduction and the Brain and Nervous System in Women. *Ann. Anat. &*

Surg. Soc., Brooklyn, Nov. HACK TUKE, Hypnosis Redivivus. *Fourn. Ment. Sci.*, Jan. EDGREN, Contributions to the Knowledge of the Temperature Diseases Induced through the Influence of the Nervous System. *Ibid.* FISHER, Habitual Drunkenness. *Boston Med. & Surg. Fourn.*, Dec. 30th and Jan. 6th. SEGUIN, The Localization of Diseases in the Spinal Cord. *Ann. Anat. & Surg. Soc.*, Brooklyn, Dec. ELLIOTT, On Spinal Irritation, with Deformities of the Limbs and other Affections Resulting from it, with their Treatment. *Dublin Fourn. of Med. Sci.*, Nov. FLEMING, Antero-lateral Sclerosis. *Am. Fourn. Med. Sci.*, Jan. CROTHERS, The Clinical Study of Inebriety. *N.Y. Med. Rec.*, Jan. 15th. CLARK, Brain Lesions and Functional Results. *Can. Fourn. Med. Sci.*, Jan. REICHERT, Notes on a Case of Hysterical Arthritic Hyperæsthesia. *N.Y. Med. Rec.*, Feb. 12th. ROSENBACH, Remarks on the Theory of the Cheyne-Stokes Phenomenon. *Deutsche Med. Wochenschr.*, No. 4. JOHNSON, A Lecture on Backache and the Diagnosis of its Various Causes, with Hints on Treatment. *Brit. Med. Fourn.*, Feb. 12th. DAY, Clinical Lecture on Some Varieties of Nervous Headache. *Ibid.* HUGHES BENNETT, Clinical Lectures on Diseases of the Nervous System; Lecture IV, Chronic Hemiplegia Originating during the Puerperal State. *Ibid.*, Feb. 19th. CLARK, Brain Lesions and Functional Results. *Can. Fourn. Med. Sci.*, Jan. and Feb. FITZ, Diabetic Coma: its Relation to Acetonæmia and Fat-Embolism. *Boston Med. & Surg. Fourn.*, Feb. 10th. WILLIAMS, Notes on Changes Seen in the Eyes of Ten Cases of General Paralysis of the Insane. *Ibid.*, Jan. 13th. SOLIS COHEN, Extreme Opisthotonos in a Case of Hystero-Epilepsy. *Ibid.* ROCKWELL, A Case of Complete and Prolonged Loss of the Senses of both Taste and Smell; Rapid Recovery under the Influence of Galvanism. *Ibid.* ABBOTT and FITZ, A Case of Hydrophobia of Doubtful Origin. *Boston Med. & Surg. Fourn.*, Feb. 17th. BJERRUM, Hemianopsia for Colors. *Hospitals-Tidende*, Jan. 19th. SEELEGMÜLLER, On the Pathogenesis of Peripheral Convulsions. *St. Petersb. Med. Wochenschr.*, No. 2, Jan. 22d. PUTNAM, The Diagnosis of Locomotor Ataxia in the Early Stages. *Boston Med. & Surg. Fourn.*, Nos. 8 and 9. ECHEVERRIA, Alcoholic Epilepsy. *Fourn. Ment. Sci.*, Jan. MILLBERG, Observations on Color-Blindness. *Nordiskt. Med. Arkiv*, xii, 1880, No. 24. DE FONTENAY, Statistics of Congenital Daltonism in Denmark, *Ibid.*, No. 18. MEDIN, On Epidermic Cerebro-spinal Meningitis in Children. *Ibid.*, No. 16. WISING, On a Case of Chronic Mercurialism, Simulating Multiple

Sclerosis. *Ibid*, No. 17. BEARD, Nervous Diseases Connected with the Male Genital Function; VI. *N. Y. Med. Record*, Feb. 19th. DITZEL, Tetanus Puerperalis. *Hosp.-Tidende*, Jan. 5th. PREYER, On the Theory of Color-Blindness. *Centralbl. f. d. Med. Wissensch.*, No. 1. MOMMSEN, On the Alterations of Irritability of the Nerves from Various Agencies, especially Poisons. *Virchow's Archiv*, lxxxiii, 2 Heft, p. 243. BECK, A Case of Myelitis Lateralis Dextra Traumatica Ascendens (Hemiplegia Spinalis), Complicated with Osteomyelitic Coxitis and Luxatio Spontanea, etc. *Ibid*, p. 301.

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND,
AND PATHOLOGICAL ANATOMY.

TROPHIC DISORDERS WITH CEREBRAL PARALYSIS.—Erb has stated, *Zmsns. Hdbch.*, xii, ii, 2d Anfl., p. 420 that trophic disorders are rare with cerebral paralysis, and that, excepting with bulbar paralysis, atrophy almost never occurs. Förster of Dresden, *Deutsche Med. Wochenschr.*, Dec. 11th, takes issue with this statement. Within two years he had had six well-marked cases of cerebral hemiplegia in children, all six with characteristic implication of the facial and hypoglossal nerves and with retention of the faradic muscular irritability. Four of these six cases had been under observation for considerable periods after the onset of the paralysis: one seven months, one a year and ten months, and the other two, five, and six and a quarter years respectively. In all these cases he found a shortening of both limbs on the paralyzed side: in two cases of one, in one of one and a half, and in one of two centimetres. One child, examined three weeks after the attack, had, on the paralyzed side, $\frac{3}{4}$ centimetre less circumference around the calf, a difference that five months later had increased to one centimetre. Another, five weeks after the attack, showed a difference of one centimetre, and the three older cases exhibited from $\frac{3}{4}$ to 2 centimetres less circumference. In only one out of the six was no change noticeable.

These discrepancies in the circumference of limbs which at most were only of from sixteen to eighteen centimetres around, are sufficiently prominent. But there were other marked signs of atrophy; flaccidity and doughy muscles and very obvious wasting of individual muscles, such as the deltoid, abductor pollicis, etc.

In two of the cases there was notable increase of the tendon (patellar reflex) on the paralyzed side. These facts would seem to indicate an implication of the anterior spinal cornua and of the lateral columns in certain regions in the diseased processes, and make it appear advisable to institute special researches into the condition of the cord in such cases whenever opportunity is afforded. But in ordinary poleomyelitis the atrophy of the muscles is not always attended with a diminution of the length of the limbs. Förster has recently examined cases of two years' standing and with notable muscular atrophy, in which there was not the least degree of shortening. It may be presumed, therefore, that, whether the centres governing longitudinal growth are situated in the anterior horns with those for the nutrition of the muscles, they are not always simultaneously or at least not proportionately affected with these latter in the cases mentioned.

GRAVE'S DISEASE.—Dr. Chas. Abadie, *L'Union Médicale*, Nov. 28, describes a case of imperfectly developed exophthalmic goitre in which the prominence of the right eye was the only marked special symptom apart from the general anæmia and constitutional disturbance. He offers, as a hypothesis to account for these undeveloped cases, the idea that the symptoms in this disease depend upon the portion of the cervical sympathetic especially involved. Thus, he thinks, pronounced disorder in any one of the cervical ganglia will produce the symptoms of Grave's disease in the part most directly connected with that ganglion; if the superior cervical is mainly affected, then exophthalmus will be the most pronounced; if the middle, thyroid enlargement will be the predominant symptom, and if the lower cervical ganglion is most diseased, then the cardiac innervation will suffer. In this way he seeks to account for the various partially developed syndromes of this affection.

COLOR-BLINDNESS IN DISEASES OF THE OPTIC NERVE.—Edward Nettleship, F.R.C.S. (London), read a paper on this subject at the forty-eighth annual meeting of the British Medical Association (reported in *Brit. Med. Jour.*, Nov. 13, 1880), held at Cambridge, August, 1880.

This paper contained a summary of observations in seventy-nine cases of uncomplicated disease of the optic nerves, including cases of tobacco-amblyopia and some cases of atrophy following neuritis. Cases of glaucoma and of retinitis pigmentosa, and

certain cases of congenital amblyopia with color-blindness and day-blindness, were not included. In fifty, the visual field was carefully measured on the perimeter; and the observations offered to the meeting bore chiefly on the various relations existing in these cases between the three factors: color-perception, acuteness of vision, and condition of the visual field. The following groups were then mentioned: 1. color-blindness of a high degree is always present when acuteness of sight is low, and the field of vision presents a high degree of sharply-defined but irregular contraction. This group includes the common cases of progressive atrophy often associated with early locomotor ataxy, but also frequently occurring without spinal symptoms. The author had never seen atrophy of the optic nerves in locomotor ataxy without color-blindness. 2. When the visual field shows a uniform contraction, moderate in degree, but not very sharply-defined, and perhaps only relative, though acuteness of sight may be very low (as low as $\frac{1}{20}$), color-perception is seldom much affected, and may be quite perfect. Such cases were considered rare. 3. If the alteration of the field take the form of a central defect (central relative scotoma), its circumference being of full size, though acuteness of sight may be as low as $\frac{1}{20}$, or even $\frac{1}{40}$, color-perception of *large objects* is but little, and often not at all, damaged; but partial or complete color-blindness for *small spots* of red and green exists; and such patients are, therefore, likely to mistake colored signal lights. Nearly all these cases of central amblyopia are caused by tobacco. 4. The visual field may show a high degree of sharply defined irregular contraction, but with perfect acuteness of vision. In such cases, (a) there may be marked color-blindness (two cases were mentioned); (b) there may not be the slightest defect for colors, of which condition also two cases in men were mentioned, and two others in women, lately recorded from Hirschberg's *clinique*, referred to. The difference between the subgroups (a) and (b) in regard to color-perception was most striking. 5. The field of vision may be perfect in size and free from any scotoma, with acuteness of vision as low as $\frac{1}{40}$, and (a) perfect color-perception (as in a woman whose case was mentioned); or (b) color-blindness, sometimes of considerable degree, may be present, two cases in young men being mentioned in confirmation.

MENTAL FAILURE FROM STRAIN.—The *Medical Press and Circular* states that Dr. Maclaren, superintendent of a prominent in-

sane asylum, has observed among the patients sent to that asylum a form of insanity which is not melancholia and which is not dementia, although it may, at first sight, be taken for one or the other of these, but which seems to be grave nervous exhaustion. It persistently appears in men who belong to the skilled artisan class. It must be remembered that the intelligent workman of the present day is a very different person from the labor of a former one, and uses, and probably overtakes his brain nearly as much as professional or business men do. The attack to which Dr. Maclaren refers, especially affects the middle-aged, whose previous history is that they have been steady hard-working men who have saved a little money, and who have always been of an anxious turn of mind. In almost all instances they have been men of aspiring temperament, but without the intellectual ability which has enabled a few of their class to rise entirely above it. Yet they are not content to remain in their station and so they plod and toil, and become a prey to anxieties. Ultimately the prospect of obtaining a high position is lost, and then they concentrate their desires on accumulating money. Their whole time is occupied in laboring and planning to increase their store, and they are vexed by apprehensions lest their schemes should miscarry. The hours which should be devoted to sleep are given up to work or to miserly calculations, and then when an illness or a grief comes upon them, they break down miserably. They are reduced to a state of utter and complete prostration, mental and physical. The surface of the body is cold and pale, the pulse is feeble, and the mental condition is listless to an extraordinary degree. Power and force seem gone forever, and the stalwart, well set-up, acute-looking artisan of a short time ago, is reduced to a gray, bent, nerveless invalid.

In this utter loss of physical power is one of the marked distinctions between this variety of mental disease and melancholia. The cases of this kind which Dr. Maclaren has seen improved under treatment, but never recovered the tone of former days. *Med. and Surg. Reporter*, Feb. 5th.

THE PATHOLOGICAL ANATOMY OF HALLUCINATIONS.—Luys (*Gaz. des Hôpitaux*, 1880, No. 142) states that, as the result of many years of study of the brains of subjects of hallucinations and illusions, he has discovered certain interesting peculiarities in the cortex and optic thalami. Those in the former location are of

two kinds, localized hypertrophy and atrophic conditions more or less marked. The meninges are found somewhat congested, but the adhesions met with in general paralysis are lacking. In the cortex itself the characteristic lesion is a prominence of the paracentral lobule when viewed on the internal face of the hemisphere. In the normal brain the curve of the superior edge of the hemisphere is regular, but in these cases it becomes even gibbous in this isolated cortical region. On incision it is seen that the cerebral substance is increased and the folds more developed. On the convex face of the hemisphere it is seen that the two marginal convolutions are also swollen and more sinuous.

This peculiarity may appear on one or on both cerebral hemispheres, but it most frequently shows itself on only one. It is more liable, M. Luys thinks, to be double in old cases.

This peculiarity in this particular region in the brains of certain lunatics had been already noticed by Parchappe (*Traité de Folie*, p. 147), but had not been associated with these special symptoms during life.

The atrophic alterations claimed by Luys to be associated with hallucinations are most noticeable in the first frontal convolution, which is diminished in size and the fissures enlarged and patent. The second frontal also shares frequently in the change, and the Rolandic sulcus and the parieto-occipital are widened and gaping. Sometimes the calloso-marginal convolution is notably atrophied. Microscopic examination reveals the superior cortical layers grayish and gelatinous, and infiltrated with serum, the deeper ones often reddened and with strongly injected and abundant vessels. The nerve cells are scattered, and those that are seen are covered with yellowish granulations, or in a more or less advanced condition of degeneration.

The optic thalami in subjects of chronic hallucinations exhibit certain degenerations that indicate that marked circulatory disturbances have occurred. Sometimes these changes are minute hemorrhagic foci in various phases of absorption, showing themselves in minute brownish or wine-colored spots; or again, there are areolar cavities disseminated through the nuclei, constituting foci of softening, connected with atheromatous degeneration of the walls of the capillaries.

A special form of chronic alteration, sometimes met with in these cases, is sclerosis degeneration. In some cases the thalami are found pale and almost exsanguined, and on section the blood-vessels are seen gaping, as if there existed a veritable interstitial

sclerosis. Microscopic examination reveals sclerosis, which, starting in a morbid thickening of the ependyma, insinuates itself into the central mass in the form of perivascular trabeculæ, and finishes by invading the different nuclei and crowding out the nervous elements. This interstitial sclerosis is accompanied by partial hyperæmias and a large proportion of amyloid corpuscles. Its tissue is formed by a very fine reticulum, very compact, and forming a homogeneous mass. This invading neoplasm produces all the usual disturbances of nutrition in the active nervous elements. The nerve cells become more or less scattered, so that in some parts they are met with only in clusters here and there. Those that do remain are, generally, granular, attenuated, and in various stages of degeneration.

In the acute forms of the hallucinatory process, and in cases that succumb during the period of excitation, we find a very intense vascularization in the central portions of the nuclei, and particularly in the gray substance of the third ventricle. Occasionally in the external regions of the optic thalami, where the fibres of the radiant crown of Reil are lost in the substance of the ganglion, the nerve cells are found notably increased in volume, and, consequently, apparently in a condition of functional super-activity.

In a certain number of hypochondriacs who have had during life either illusions or hallucinations of the visceral sensibility, M. Luys has observed that the networks of the central gray substance, which represent the localities of transmissions of impressions irradiated from the visceral periphery, were the seat of patches of hyperæmia, of diffuse reddened spots, which indicate the persistent traces of foci of hyperæmia, neatly localized. In these cases the walls of the third ventricle were more or less rose-tinted and exhibited scattered, discrete, vascular striations, and here and there patches of very intense hyperæmia.

In the above pathological findings we have, as M. Luys points out, evidences of chronic hyperæmia ; traces of old congestions in the central gray matter of the optic thalami and the third ventricle ; and also similar traces of hyperæmia with concomitant degenerations in various portions of the cortex. These two centres of cerebral activity are found associated in their morbid conditions as in their functions. In the physiological conditions it is the cells of the nuclei of the optic thalami that transmit to the various cortical regions the impressions that pass by their networks. In pathological conditions the same cellular elements enter *motu proprio* into action, under the influence of local excitation, of per-

sistence of certain vibrations, and of special circulatory troubles, and transmit to the cortex incitations created in themselves and having no connection whatever with the external world. These fictitious incitations are then dispersed over the receptive tracts of the cortex, and produce in the sensorium their special sensorial disorders and appropriate emotional states. Hence the various concepts of the subjects of hallucinations and their obstinate abnormal emotive conditions. The hallucinatory stimulus is always in its beginning sensorial in its nature according to the special set of cells in which it takes rise, whether auditory, visual, gustatory, etc. But like all similar normal stimulations destined to lose themselves in the sensorium, it is natural for this to diffuse and implant itself there, and in the centre of psychic activity it gradually loses its primary sensorial character and takes on a different form of existence, losing all apparent traces of its origin. What was first a simple morbid excitation of the sensory cells in the thalamus, is, according to this theory of M. Luys, transmitted to the cortex, where it elaborates itself into complete psychic conceptions.

The unilateral character of the cortical changes observed is noteworthy, and may possibly help to explain, M. Luys thinks, certain unilateral hallucinations and the co-existence of hallucinations with perfect sanity.

As to the etiology of hallucinations it will be readily seen from the above that, according to M. Luys' views, lively impressions which, made upon the senses, leave their impress, may be revived through morbid irritations of the portions of the brain involved, by anything, for example, that can disturb sufficiently their circulation, such as cerebral congestion from any cause, certain drugs, etc.

THE RELATION OF THE OVARIES TO THE BRAIN AND NERVOUS SYSTEM, is the subject of a paper read before the New York Academy of Medicine, December 16th, by Dr. Alex. J. C. Skene, and printed in full in the *American Journal of Obstetrics*, for January. After speaking of the general functional connections of different organs and their influence upon each other in health and disease, he discussed the ovaries in their relations to the other sexual organs. Everything pointed to the conclusion that they were paramount in reproduction and in the maintenance of the relationship between the general and the sexual systems of women. He accepted, without qualification, the state-

ment of Virchow and others that the ovaries give to woman all her characteristics of body and mind.

Then referring to the reciprocal influence of the nervous system and the reproductive functions, attention was directed to the fact that the sexual organs, while dependent on the general nutritive system for support, reacted again upon the organism as well as were affected by its conditions. From a somewhat extended consideration of the subject he was convinced that a great many affections of the brain and nervous system were due to disease of the ovaries. Their imperfect development not only modified the physical peculiarities of woman but also retarded the development of the higher nerve centres. A large part of the brain and nerve power of woman is devoted to reproduction, and when a woman is deprived of her sexual organs, the nutritive system might attain a normal development but the nervous system does not. There is usually mental weakness and often mental disorder among those whose ovaries are imperfectly developed. Twelve out of sixteen young women under his observation in an insane asylum, had imperfectly developed sexual organs. Some of them had never menstruated and others only imperfectly, and the history of these cases led him to think that defective development of the ovaries is an important factor in the production of insanity. At any event, there was enough in them suggesting this to invite further investigation to settle the question as to the relations between the ovaries to insanity and other nervous disorders occurring at puberty.

Next speaking of the effects of derangements of menstruation on the nervous system, Dr. S. holds that, in estimating these effects, the relative power of the different sexual organs has not been adequately considered. In the forms of dysmenorrhœa connected with ovarian derangements, he thinks the nervous system is much more disturbed, as a rule, in proportion to the local pain, than in those due to uterine lesions of flexion or displacement. The ovaries also act directly on the uterus, and we find menstrual derangements with perfectly normal conditions, except evidence of imperfect ovarian development or ovarian disease. When such patients suffer from nervous affections it is common to hear it said that they are due to the menstrual disorder, while in reality the point of departure from health is in the ovaries.

Degenerations of the ovaries, including neoplasms, do not seem to be attended with nervous derangement, beyond such as is due to the mechanical disturbance by tumors, etc.

He believes that inflammatory affections and displacements of the ovaries are more likely to cause serious remote effects, than disease of any other pelvic organs. Indigestion, spinal irritation, neuralgias, headaches, insanity, etc., attributed to uterine disease, can often, by careful search, be referred to some accompanying trouble with the ovaries. The conclusion reached by him, from years of observation and experience, is that while uterine disorder does often disturb the nervous system, it does so to a far less extent than disease of the ovaries. He reviews a complication of symptoms connected with simple ovarian tenderness, and practically nothing more, which may be attributed or not to inflammation, according to the view accepted by the author. These symptoms comprise considerable systemic disturbance, and sometimes great mental irritation and hysterical manifestations. Prolapsus of the ovaries, from whatever cause, also produces serious nervous disturbance, and he attributes to the presence of this complication the much greater general disorder observed in some cases of laceration of the cervix than in others. The nervous disorders observed with some cases of pelvic peritonitis, are also attributed to involvement of the ovaries in the morbid process, and in two cases of mania with uterine cancer, that came under his observation, he was also led to suppose that the ovaries were the disturbing elements. Dr. Skene agrees with Peaslee, who held that hysteria was connected with some condition of the ovaries rather than with uterine disease, and the recent developments by Charcot and others, in regard to the condition known as hysterio-epilepsy, seem to favor this view.

The diagnosis of ovarian disease naturally presents some difficulties, the nature of many of these affections and their clinical history being as yet imperfectly understood. This is less the case with ovaritis and displacement, in regard to which he referred to Dr. Mundé's paper in the fourth volume of the gynecological transactions. Menstrual derangements and the graver conditions of nymphomania and epilepsy are much more difficult for diagnosis, and the varied results obtained by Battey and others from removal of the ovaries, show clearly how uncertain even the best authorities may be in this respect. The exact relations, causative or secondary, of the ovarian trouble at the time must be carefully searched out. The products of pelvic inflammation may cause reflex irritation, and the ovaries be only the secondary sufferers rather than the primal cause. A case related by Battey in which he was only able to break up old adhesions instead of removing

the ovaries, is in point, since relief was obtained by merely this operation.

The treatment of ovario-neuroses is considered very briefly by the author. Both the nervous system and the sexual organs should be treated, not one to the exclusion of the other. In amenorrhœa, or irregular or scanty menstruation, local stimulants and especially electricity are useful. Marriage is generally beneficial in irritable and congested conditions of the ovaries, but is disastrous in inflammatory affections and prolapsus. In this latter condition, something can be done in the way of mechanical relief by pessaries and postural treatment; local sedatives and counter-irritation are also sometimes beneficial. The bromides are sometimes of the greatest value in obscure ovarian disease, and Dr. Skene prefers, as least likely to disagree with the stomach, the bromide of sodium, and gives large and frequently repeated doses till its characteristic effect is produced. Conium may be used in the same way. It is not advisable to make prolonged use of these drugs, at least not in large doses, and they should be combined with tonic treatment. The state of the bowels ought to be carefully looked after, as constipation aggravates the suffering. Opium, chloral, and alcohol often give relief, but their use should be limited and carefully watched, as these patients readily acquire a dependence on such agents.

The paper concludes with an account of five cases illustrating the ideas contained in the paper.

LOCAL SYMMETRICAL ASPHYXIA OF THE EXTREMITIES.—In the *Gaz. des Hôpitaux*, No. 13, Feb. 1. M. Hardy gives an account of a case now in the Hospital La Charité at Paris, of an affection rather rare in its advanced form here described, but which in its earlier and middle stages is not altogether unfrequent. It was that of a young man who, after having been exposed to a sudden change from a high temperature to cold, was taken with paralysis of both hands; sensation of all kinds being completely lost, and motion to a very large extent, and completely as regards the hands. There was also a slight choreic movement of the eyelids, and a bluing of vision. This was the second time the patient had been thus attacked, the former attack having lasted six months. M. Hardy gives to the disorder the name of local symmetrical asphyxia of the extremities, and considers it only a degree of the disorder described by M. Maurice Raymond under the name of symmetrical gangrene of the extremities, a condition

only very rarely met with in its full development. The much more frequently observed "*digiti mortui*" is a still milder and more temporary phase of the same complaint. The following are M. Hardy's general remarks on the disorder :

"It affects especially young persons, from fifteen to thirty years old ; both sexes are liable to it, but females appear to be, according to the observations, more predisposed to it than males. The immediate cause is exposure to cold. Unfortunately this cause is not proven, for the first attack of our present patient occurred in the month of July.

"The disease exhibits three different periods or degrees of development. The first is characterized by numbness or pallor of one or more fingers or of the whole hand. This is what is called 'dead fingers,' these members appearing white as if bloodless, the patient declaring that sensation is lost. This period has been called by M. Raymond 'local syncope.' I do not like this term 'syncope,' which indicates properly an arrest of the cardiac circulation, and much prefer that of 'local anæmia,' which seems to me to better express the actual conditions.

"The disorder may stop at this point, the phenomenon being, from time to time, reproduced, lasting a few hours or days, and the members then recovering their normal appearance and condition.

"The second period or degree is characterized by the local asphyxia of the extremities described in the present case, a lesion constantly symmetrical, occupying either the feet or the hands, and usually both at the same time. The symptoms are numbness and coldness of the tissues, so that the temperature is lowered in the parts involved to 21° , 20° , or even 19° C. ($=70^{\circ}$, 68° , 66.5° F.). There is also blueness, violaceous or cyanosed coloration, disappearing under pressure to slowly return, and more or less complete anæsthesia, that is, diminution or abolition of the tactile sensibility, of that to pain and to temperature. Finally, in almost all cases the patients experience spontaneous lancinating pains, like that of a severe burn, so severe at times as to prevent sleep or rest and to call forth loud cries.

* * * *

"The third period is that which really deserves the name given to the disease by M. Raymond, viz., symmetrical gangrene of the extremities. After generally a rather lengthy period, there are found on the affected parts phlyctenulæ containing dark-colored, sometimes even bloody serum, which breaks after a while, leaving

an ulceration that gradually dries up, and gradually other phlyctenulæ appear and act in the same way. The termination may occur in one of two ways: either the fingers become more and more tapering, the skin clings to the subjacent tissues, and there is a veritable sclerodermy with alteration of the tactile sense, or the disorder terminates in a genuine gangrene, dry, black, with atrophy of the integuments, with all the characters of senile gangrene, suppuration, sloughing of black eschars and mortified portions, and the patient recovers with mutilation.

"The recovery, whatever the form of the disease, is invariable, after a varying period, generally protracted.

"In our patient we have the second stage of the disease, with some variations from the tableau described by M. Raymond. Thus, on the one hand, there are none of the spontaneous pains mentioned by that author, and, on the other, there is a muscular paralysis that has not been heretofore observed, or which, at least, has not extended further than slight benumbing. Finally, our patient is now a second time affected. Relapses have been observed before in this affection by my colleague at La Charité, with this peculiarity, that they generally are each time worse than the preceding attack.

"The treatment is indicated by the nature of the disease, which is of nervous origin. Thus, long applications of the constant current, irritant frictions with camphorated alcohol, tincture of nuxvomica or cantharides, may be usefully employed; likewise sulphur baths.

"This local symmetrical asphyxia, or symmetrical gangrene of the extremities, as we may choose to call it, is, as we have seen, a *bizarre* affection, offering similarities to sclerodermy and to the anæsthesia of lepra. There is an alteration of the functions of the capillary vessels, characterized by gorging of the veinules with venous blood, and resulting in a sort of paralysis of the vaso-motor nerves. There certainly exists some disorder of the central nervous system, of the spinal cord in the vicinity of the medulla, and I base this statement on the constant symmetry manifested by the phenomena, and on the paralysis of the radial and the muscles it supplies, as much in the right hand as in the left. But what is this lesion? This question can only be answered by further observations, when we can have the light afforded by an autopsy."

OCULAR SYMPTOMS IN GENERAL DISEASES.—There are few general affections that do not more or less involve the organ of

vision, and the ocular phenomena to which they give rise in certain cases form a valuable element for the diagnosis. For this reason Dr. Gorecki has endeavored to bring together in review the principal affections of which the appearance of the eye may give rise to a suspicion, or confirm the existence.

Blepharoptosis or droop of the superior eyelid indicates a complete or incomplete paralysis of the third pair. The lids on both sides, in a young female especially, cause a suspicion of hysteria.

Lagophthalmus, or inability to completely close the palpebral opening, is a sign of idiopathic facial hemiplegia, or is symptomatic of a cerebral affection.

Strabismus occurring suddenly and accompanied with diplopia is generally the result of a cerebral affection.

Xanthelasma of the lids appears under the influence of certain alterations of the liver.

Subconjunctival ecchymoses are frequent in whooping-cough, and may sometimes, in the beginning, serve to clear up a dubious diagnosis.

Redness of the conjunctiva, tears, and photophobia, and sometimes even a little catarrhal secretion, indicate in infants the imminence of an eruptive fever, notably measles. Tears are an important prognostic sign; good if, in crying, they appear, and bad if their secretion is suppressed.

Sclerotomy or episcleritis is, nine times out of ten, a symptom of gout, like tophus of the ear.

Spots on the cornea are often indicative of a strumous diathesis.

Dilatation of the pupil, or mydriasis, indicates either excessive fatigue, or the existence of intestinal worms, or meningitis in its second stage, or a veritable amaurosis.

This dilatation is frequently connected with atrophy of the optic nerve. It is also observed during the epileptic attack, in the period of resolution from chloroformization, after intoxication from belladonna, datura, etc. Unequal dilatation of the two pupils is a sign of the beginning of general paralysis.

Contraction of the pupil, on the other hand, or myosis, is an early sign of tabes dorsalis. It is met with also at the commencement of meningitis, and in poisoning by opium or chloral in its early stages.

Deformity of the pupil, especially after instillations of atropine, indicates an old iritis, which, in nine cases out of ten, is of syphilitic origin, when not due to disease of neighboring organs.

Cataract, in persons still young (forty to fifty years), is frequently of diabetic origin, and of the soft variety.

Exophthalmus is indicative of exophthalmic goitre.

Finally, the ophthalmoscope reveals to us the so-called albuminuric retinitis in Bright's disease, in simple polyuria, and sometimes in pregnant females. Retinal hemorrhages, œdema of the retina, and embolism of the central artery, are met with in organic cardiac disease. Optic neuritis and perineuritis, and papillary atrophy are symptomatic of syphilis and of tumor near the cerebellum and corpora quadrigemina. Finally, tubercles of the choroïd almost always accompany tubercular meningitis, and are a valuable element of diagnosis between that affection and typhoid fever.

EYE SYMPTOMS IN LOCOMOTOR ATAXY.—Dr. J. Hughlings Jackson read a paper before the Ophthalmological Society, London, Dec. 9, 1880 (*Lancet*, Dec. 18, 1880), in which three well-marked non-ocular tabetic symptoms were considered, in connection with certain ocular symptoms. Twenty-five cases, in different stages, furnished the materials for the communication. Of these there were twelve of optic atrophy. In two there were also ocular paralyses, and in one a history of it; in nine there was Westphal's symptom. In one of the three, without this symptom there had been no pains; gait was slightly ataxic. In the second there had been double vision ten years ago; there is now paresis of the left third nerve; this patient had pains, but his gait was normal. The third case was one of atrophy of one disk, with limitation of the field outward and downward; this patient saw green as gray and red as reddish brown; he had pains, but his gait was good.

In one case, in which there was paralysis of those parts supplied by oculo-motor nerve trunks, it was noticed that the patient had no positive symptom except Westphal's (tendon reflex). This patient's pupils acted well to light and during accommodation; he had no pains of any sort anywhere. In one case, with normal pupils and Westphal's symptom, there had been paralysis of the third nerve. In one case of inactive pupils, with Westphal's symptom, there had been temporary double vision. In another, with inactive pupils and Westphal's symptom, paralysis of one sixth nerve. That condition of the pupil, observed by Hempel, Vincent, Erb, Hutchinson, and others, called the Argyll-Robertson pupil, is a double condition, negative and positive, and in this way

resembles the so-called disorder of coördination of locomotor movements. This symptom is not peculiar to tabes; it may be found in general paresis of alienists—at least, reflex pupillary immobility. Erb's diagram was exhibited to the society, which gave that physician's view of the central conditions corresponding to the double pupillary condition, and the following case was cited, which was considered a very rare one: A woman, aged twenty-six years, had sought advice, simply because her right pupil was larger than the left. It had been so for three years. The right pupil was dilated, and absolutely motionless to light, and also during accommodation. Yet her ciliary accommodation on this side was perfect. She could read No. 1 Jaeger from fourteen inches up to five, or by effort to four. The field was perfect. The fundus was normal, except that the veins were large, and convoluted at the disk, probably physiological; the media were clear. Her sight with this eye was perfect. The pupil of the left eye was most active, and of normal size; the left disk was slightly paler than the right; the veins as on the right; macula normal; double slight limitation of nasal part of the field. She could read Jaeger No. 2 with the left eye, but the centre syllable of a long word seemed blurred. She seemed to be in perfect health, except for the ocular abnormalities mentioned. In testing her knees not the smallest trace of the knee phenomenon could be found.

There were no other symptoms of tabes. Erb has found the pupillary condition in patients who had no other nervous symptoms, as well as in nervous affections which could not be classed as tabes or as general paresis. Again, it is not said that the action of light may not be present in very well-marked cases of tabes. Pagenstecher has recorded a case verifying this fact, and it has also been observed by Laidlaw Purves.

Twenty years ago, Dr. Jackson had observed that many men who had "white atrophy" of the optic disks, had also lightning pains in the legs; and later, on making a distinction as to the kind of atrophy, he concluded that the pains were a symptomatic link between "uncomplicated amaurosis" and locomotor ataxy. This atrophy is now more particularly described as gray degeneration, and is supposed by Charcot and others to be parenchymatous. The peculiar limitation of the field of vision in cases of the atrophy in tabes is significant when we consider that the developed disease is in great part one of the locomotor system. The limitation would seem to correspond roughly to certain ocular de-

viations from cerebellar disease, in the way that hemiopia does to lateral deviation of the eyes from cerebral disease. In all cases of optic atrophy we should enquire for the pains, and test the knees, whether the gait be abnormal or not. The pains are often bridging symptoms between so-called uncomplicated amaurosis and tabes. Charcot says that, as far back as 1868, he pointed out that the great majority of women admitted into La Salpêtrière for amaurosis have, sooner or later, manifestations of tabes. He mentions one case in which the amaurosis preceded the pains ten years. Gowers has seen a case of tabes, in which optic atrophy preceded other ataxic symptoms twenty years. *N. Y. Medical Record*, Feb. 12.

THE INCREASE OF FIBRINE OF THE BLOOD IN PERICEREBRITIS. —Dr. Daniel Bonnet, Physician-in-Chief of the asylum at Evreux, France, publishes, *Ann. Méd. Psych.*, January, 1881, the results of his investigations in regard to the fibrine of the blood in general paralysis. The fibrine increases, as is well known, in acute inflammations, and decreases in pyrexias; its normal average in health is .022 to .023 per cent. He commenced the investigation when an interne under Calmeil at Charenton, but had not been able to continue it steadily. The method employed was that of Andral and Gavarret. The fibrine, extracted from the clot, washed with care and desiccated, was then weighed; the fatty matter still contained naturally increases the weight. In six cases of cerebral hemorrhage he found, like Andral and Gavarret, a decrease of fibrine, it ranging from only .017 to .0214 per cent. In two cases of delirium tremens it was .0145 and .016, and in three cases of acute mania it was .0265, .03, and .0314.

In 30 cases of general paralysis the amount of fibrine varied between .013 and .059 per cent., being in relation with the intensity of the inflammation. The minima .013 and .0186 were met with in two cases of general paralysis of the dement type; slow in progress; and the blood was taken at the close of the second period on account of slight and temporary symptoms of cerebral congestion.

In 24 cases the weight of the fibrine varied from .02 to .0332 per cent., the average being .026. Four cases, in which it exceeded .04 per cent., are related in more or less detail. The conclusions of the memoir are as follows:

General paralysis, like every other chronic inflammation, does not produce an increase of fibrine in the blood when it takes a

slow and regular course. The quantity may even be diminished in some cases. An increase occurs when the phlegmasic phenomena become very intense, exceeding the ordinary acute stage. The percentage by weight of fibrine may then attain the figure of .059.

FOLIE À DEUX.—M. Marandon de Montezel, *Ann. Méd. Psych.*, January, 1881, discusses the subject of folie à deux, noticing the previous memoirs of MM. Lasègue and Falret, and Emanuel Regis. He recognizes the forms described by these authors, and adds a third based on the contagion of insanity in predisposed cases. He narrates histories of four cases illustrating these forms, and concludes as follows :

The principal ideas on which this memoir is based may be summed up in the following conclusions :

I. *Folie à deux* include three perfectly distinct orders of cases:

1. *Folie imposée*, in which an insane person imposes his insane conceptions upon another, more feeble morally and intellectually than himself, under certain conditions already developed in the paper of MM. Lasègue and Falret.

2. *Folie simultanée*, in which two hereditarily predisposed individuals contract simultaneously the same type of insanity, under certain conditions formulated by M. Em. Regis.

3. *Folie communiquée*, in which an insane person communicates his hallucinations and delusions to another person hereditarily disposed to insanity.

II. It seems necessary for three indispensable conditions to simultaneously combine to produce the *folie communiquée* :

1. A well marked hereditary predisposition in the recipient or passive party to whom the disorder is communicated.

2. In every case as intimate an association as possible between the two persons who will share the insanity.

3. Incessant action on the part of the insane person upon the mentally-sound person to cause him to adopt the hallucinations and delusions of the former.

III. In a medico-legal point of view the passive individual in the *folie imposée* is more or less weak-minded or imbecile ; and, even when he coöperates in the insane acts of the other active party, he need not be considered as an insane person in the strict sense of the term. On the other hand, in the *folie simultanée* and the *folie communiquée*, both parties must be considered insane.

IV. In a medico-legal point of view, in the *folie imposée*, the

appearance of insanity is a relative matter, and the expert, in order to draw a conclusion in regard to it, should study to inform himself in respect to the previous psychic condition of the passive receiving individual.

V. *Folie simultanée* and *folie communiquée* are only two particular instances of the general influence of surroundings on the forms taken on by mental alienation.

VI. It is also by the general influence of the environment that we have to explain the fact that all the cases of *folie à deux* are delusions of persecutions; it is the type of the nineteenth century.

This last proposition needs the explanation that it applies more directly to the *folie simultanée*, in which Regis made the observation that all the cases were of this character. We see no reason why it should necessarily, for any one of the types described, be exclusively the case, and doubt the generalization.

NERVOUS PHENOMENA OF DYSPEPSIA.—At the session of the Soc. de Biologie, Nov. 13th (rep. in *Gaz. des Hôpitaux*), M. Leven described the nervous symptoms developed in dyspepsia, disorders of sensibility and motility and of the cerebral faculties, and intends, at a later time, to mention the special nervous attacks confounded hitherto with those of hysteria, from which they are entirely distinct, and which disappear as the functions of the stomach are reëstablished. At present he confined himself to the disorders of sensibility.

Briquet has described among the constant symptoms of hysteria, hyperæsthesia, in which he includes dermalgia, myosalgia, epigastralgia, rachialgia, etc.

Hyperæsthesia is not a phenomenon appertaining to hysteria, but to dyspepsia, so frequent among hysterical subjects, and the eminent physician of La Charité has referred to this neurosis a symptom that does not belong to it. M. Leven has analyzed twenty-four observations of dyspepsia, a sufficient number of cases to show the conditions of the development of this symptom.

In ten cases only, out of the twenty-four, was the hyperæsthesia lacking; this shows the frequency of the symptom.

If hysteria is rather frequently met with in females, it is, on the other hand, very rare in males, so that it was for a long time denied that it could be produced in the masculine sex. But hyperæsthesia was observed to be one-half more abundant in males than in females. Hysteria is a disease beginning generally at the

epoch of puberty, and decreases generally as the female advances in age and passes the thirtieth year. The symptom, hyperæsthesia, has been observed by M. Leven only three times in females between twenty and thirty years, and only twice in males; it is most frequent after the age of forty, and is observed in both sexes up to sixty years.

Thus, there is no comparison between this symptom and the common manifestations of hysteria. Hyperæsthesia attacks, by preference, the left side of the body, in its superior portion, the skin of the thorax, the intercostal muscles, the skin of the back on the left side, and the underlying muscles. All of the back on the left side of the vertebral column, through the whole range of the dorsal vertebræ, is painful to pressure. The hyperæsthesia extends to the neck, the cranium, the region of the kidneys, and even the leg on the left side. It does not always begin on the left side; it is often met with on the right, and in symmetrical parts on the back, thorax, etc. Nevertheless, it is most common on the left.

When the dyspepsia is very severe, both sides of the body are often hyperæsthetic, but one is more so than the other, and the hyperæsthesia may generalize itself in the skin, the muscles, the joints, the limbs, etc. Sometimes a surface, of some centimetres in extent, of skin or muscle, may become the seat of crises or attacks of severe pain, which the patient may even try to suppress by hypodermic injections of morphine. I have observed these in a woman of fifty-seven years, in men aged sixty-three, sixty-six, thirty-nine, and forty-two years. They occurred in the back and thorax of the left side, in the thorax on the right, in the region of the stomach, and behind the great tuberosity.

These have not been previously noticed; they disappear as the stomach itself is restored to health.

M. Leven declares that the hyperæsthesia of dyspepsia is never accompanied with anæsthesia in other parts of the body, at least in an individual not hysterical. Anæsthesia is the characteristic of hysteria; hyperæsthesia, of dyspepsia. In his service in the Hospital Rothschild, he had a woman, twenty-two years old, an invalid for many months, who exhibited hyperæsthesia of the right side, and anæsthesia of the left (upper member and thorax), and had explained it to his students as a case of hysterical dyspepsia. It was sufficient to merely use pressure over the ovarian region, to produce a hysterical attack.

The symptom, hyperæsthesia, *en résumé*, may be, nevertheless,

considered as appertaining to dyspepsia, and not to hysteria. It is rather more common in men than in women, at an advanced age rather than in youth ; it is aggravated with the dyspepsia, and disappears when a rational treatment is applied to the general condition.

POSTHEMIPLEGIC HEMI-ATAXIA.—J. Grasset gives (*Progrès Médical*, 1880, No. 46) an account of a patient who, after an irregular life, with all kinds of excesses, had a series of apoplectic attacks, always followed by right hemiplegia and embarrassment of speech, and came under his care after the fifth of these attacks. He was suffering then from right hemiparesis, some trouble in speech (speech slow, and tendency to use all verbs in the infinitive). The right hand, in repose, showed nothing abnormal, but whenever he attempted to use it, the fingers were seized with irregular contractions, preventing him, for instance, from writing, etc. When he extended the right arm, there were only slight oscillatory movements.

The patient left the hospital, and indulged in new excesses, so that after two months' absence he returned with all these symptoms aggravated, the face involved in the hemiplegia, the ataxic movements exaggerated, and not affected by occlusion of the eyes, and generally much enfeebled. The patient died of generalized pleuro-pneumonia a little over a month later.

At the autopsy the principal points of interest were the following: Nothing abnormal in the right hemisphere, as shown in Pitres' cuts. In the left hemisphere there was found a focus of softening, occupying, in the pediculo-frontal section, the height of the striate body, and, in the frontal cut, the caudate nucleus, and the whole height of the optic thalamus, the internal capsule, and the lenticular nucleus. At this horizon the lower portion of the internal capsule is yellowish. The second focus of softening, of much less extent, occupied the internal (ventricular) third of the optic thalamus. The third, which was extremely minute, was situated in the lower portion of the thalamus, bordering the internal capsule, which, at this point, was intact. The other sections revealed nothing abnormal.

There were numerous adhesions of the dura and arachnoid along the interhemispheric fissure, slight atheroma of the arteries at the base of the brain, and evidences of chronic meningitis of the convexity of the left hemisphere. The case is of clinical rather than of pathological interest, and does not throw very

much light on the question of cerebral localizations, except, perhaps, in a negative way. The phenomena of hemi-ataxia, after lesions of the brain, are not altogether novel; we have ourselves under observation one case of the kind, following an apoplectic attack, with a history of temporary complete right hemiplegia of the limbs, and crossed paralysis of the face, which still remains, to some extent. There is also disorder of speech. The symptoms seem to favor a lesion of the pons in this case, and that agrees with the pathological findings in somewhat similar cases reported by Leyden and Kahler.

IDIOPATHIC LATERAL SCLEROSIS.—Dr. John E. Morgan describes in the *British Med. Jour.*, January 29th, several cases of spastic spinal paralysis, one of which proved fatal. An autopsy was made with microscopic examinations of numerous sections of the spinal cord by Dr. Julius Dreschfeld. The lesions found were patches of sclerosis, of varying extent, in the lateral columns, most marked in the dorsal region, but nowhere trespassing on the anterior or posterior horns or the anterior or posterior columns. Sections were sent to M. Charcot, who found the lesions very characteristic, and who said the case was unique, as far as at present observed, in the exclusive involvement of the lateral columns in the sclerosis, without any participation of the posterior columns.

HYDROPHOBIA.—The following are the conclusions of a memoir by M. Debove (of Pau), read by M. Beauvais at the session of the Société de Médecine, Paris, July 19, 1880, as given in the *L'Union Médicale*, November 14th.

This memoir may be summed up in one principal conclusion, taking in, in its *ensemble*, the question of pathological physiology that we have studied in detail, according to the results of reasoning and experiment.

The producing agent of hydrophobia is not absorbed. It propagates itself insensibly along the nerve-fibres that are affected by the virulent liquid.

As regards the secondary conclusions, which are only the development of that announced, they are comprised in the following propositions :

1. The propagation of the hydrophobic virus is done by way of the axis filaments and the corresponding nerve-cells.
2. The sensory nerve-fibres are probably alone affected, to the exclusion of the motor ones.

3. The morbid agent progresses slowly, in a *centripetal* direction, from the locality of the bite to the medulla, and very rapidly, in a centrifugal direction, from this last-named organ back to the sensory nerves from which it comes.

4. The symptoms of hydrophobia appear at the moment when the virus reaches the medulla, and are frequently announced by pain radiating only along the corresponding nerves coming from the seat of the bite.

5. The period of incubation is, as a rule, the shorter, the less the distance of the wound from the medulla. Hence, it is shorter in infants than in adults, with wounds of the face than with those of the limbs, and, probably, in persons of small than in those of large stature.

6. Everything leads us to believe that, in certain cases, the transmission of the hydrophobic virus may occur by a recurrent route ; that is, after having begun at the peripheral end of torn or denuded nerve, it continues its course by way of the anastomoses of this nerve with an adjoining one, and follows the latter to the mesencephalon.

7. The anatomical dispositions that multiply the flexures of a nerve, or the circumstances that affect its nutrition seem to increase the duration of the period of incubation, and *vice versa*.

8. The morbid phenomena which characterize the period of invasion, affect the general and special sensibility, which first becomes exquisite, and ends by being exhausted, in some cases finishing with paralysis. Thus, paralysis of the vaso-motor centres in the medulla causes congestions of all the organs, and, consecutively, asphyxia and considerable elevation of temperature.

9. The lesions of hydrophobia are of two kinds : the one, *primitive*, visible only with the microscope, and consisting in more or less marked opacities of the nerve-cells, and in a granular condition of these cells, and a certain number of afferent or efferent fibres ; the other, *late*, visible to the naked eye, and consisting in more or less marked congestions of various organs.

10. Once in contact with the nerve-cells of the medulla and the pons, the virus, in all probability, is rapidly transported in all directions, according to routes of the fibres from the nerve-centres.

11. It is probable that when the nerves thus charged with the virulent principle are superficial, under a very thin and permeable mucous membrane, this contagious principle may traverse the mucous membrane and show its effects on the epithelium in the form of vesicles of various sizes. From this may arise the viru-

lence of the buccal secretion, so well attested, on the one hand ; and, on the other, the formation of lyssas, in certain rare and exceptional cases ; and still also the dangers to be feared from suction.

12. The characteristic lesions of hydrophobia may be unilateral, as is demonstrated by reason aided by attentive observation. Hence, it follows that the fluids may become virulent only on one half of the mouth, and, therefore, only one half of the bites are effective ; a view confirmed, in fact, by the statistics collected by Renault.

13. The virulence of the bronchial form is dubious.

14. The bites of wolves are the more dangerous, as they are given with greater ferocity, and insure more fully the mixture of the fluids of the two sides of the mouth.

15. The virulence of the buccal liquids persists twenty-four hours after death. Hence the possibility of experimenting variously on animals with security.

16. Hydrophobia belongs to a large class of affections of peripheral origin, such as certain eruptive fevers or certain neuroses, like vaccinia and variola from inoculation, and probably syphilis, also such as ascending neuritis, epilepsy, tetanus, certain forms of cylindrical neuroma of the skin, etc.

17. The transmission of the virus by the nerves, or the nervous theory, is one of extreme simplicity, that has already led an English physician of the last century, Hicks, to put into execution one of the most striking therapeutic indications of this disorder.

18. On various accounts we are led to substitute this theory for the blood-disease theory that has always prevailed, and still prevails, among physicians.

19. A complete demonstration of the nervous theory has only become possible by the recent progress of statistics and of pathological histology.

20. This theory leads us to very precise therapeutic indications, while the blood-theory has, up to date, apart from the practice of immediate cauterization of the wound, produced only a profound skepticism, and a treatment grossly empirical and nearly worthless.

As regards the therapeutic indications deduced from the present study of the pathology of the disease, they are four in number, and are :

1. To destroy the virus locally.

2. To prevent its transmission to the medulla in case it is not destroyed.

3. To obtund, in advance, the sensibility of the medulla during the whole period of incubation, and as thoroughly as possible, in case the two preceding indications were impossible to be fulfilled.

4. To act also with quickness and energetically on this same sensibility of the medulla, by hypodermic injections into the veins ; to fight, in fact, the ordinarily rapid progress of asphyxia.

The above conclusions seem to us fanciful rather than otherwise. The idea of the virus circulating in the nerves is not altogether a physiological one, as nerves are not exactly organs of circulation. It is possible, however, that some at present undiscovered morbid process may extend itself by these routes, and the nervous theory, in this sense, be correct. But it requires a different phraseology from that adopted by M. Debove.

At the session of the Acad. de Médecine, November 2d (rep. in *Gaz. des Hôpitaux*), M. Colin reported a case of a sub-officer of artillery, bitten by a rabid dog, in Algeria, November 2, 1874 ; a comrade, bitten at the same time, dying forty days later of hydrophobia. The officer felt no inconvenience whatever till four and a half years later, when he also was seized with the disease and shortly succumbed. The military authorities requested M. Colin to carefully examine the case, since, the wound having been received when in the line of his duty in succoring a comrade, the pension to his family depended upon whether that was the cause of his death or not. M. Colin was able to answer the query to his own satisfaction in the affirmative, notwithstanding the long period of incubation. The circumstances all precluded any other disease, such as alcoholism, etc.

He asks: Is this remarkably lengthened incubation altogether inexplicable ? Hydrophobia has no fixed period of latency, and he compared it in this respect to certain cases of pernicious malarial fever, in which the outbreak of the disease only occurs long after exposure.

The case formed the subject of discussion at the next following meeting of the Academy of Medicine. M. Bouley doubted the correctness of the diagnosis ; so long a period of incubation was altogether remarkable, and called for a great reservation of opinion in regard to it. M. Colin also had not verified his diagnosis by the discovery, at the *post-mortem*, of the characteristic lesion noted especially by MM. Gombault and Nocart, of foci of white

globules in the perivascular lymphatic sheaths in the floor of the fourth ventricle. Another equally important diagnostic point, that of inoculation of rabbits, had also been neglected by M. Colin. The point that the patient had not been bitten in the interim was not conclusive, since inoculation might occur in other ways, such as by the dog licking the hand, etc.

M. Maurice Raynaud said that the lesions described by M. Bouley were not alone characteristic of rabies ; they also occurred in fatal chorea.

M. Bouillaud supported M. Colin, and the latter, replying to M. Bouley, admitted that he had not sought for the lesions described by M. Bouley, as he did not suspect their existence, and, moreover, the facts stated by M. Raynaud deprived them of much of their importance. He regretted that he had not experimented on rabbits, but the experiments on these animals, alluded to by M. Bouley, had not been made when he observed his patient, and he considered himself somewhat excusable. He had, moreover, in his investigations, found that the patient had been very cautious in regard to exposing himself to any inoculation in any manner.

As the case stands, it is certainly open to doubt, if any one choose to discredit the diagnosis, which was not absolutely perfected and confirmed by all the tests now available. But it cannot be positively denied on any *a priori* grounds, and the long period of latency does not, of itself, absolutely discredit it. We do not know how long a time hydrophobic virus may take to produce its ultimate effects, and if six months or a year are not uncommon, we cannot say that in altogether exceptional cases it may not require a still longer period. But this case only suggests, does not prove this.

While the above case, if admitted as genuine, shows the extreme limit, so far as reported, of the incubation of hydrophobia in the human species, a recent report on the disease by Dr. T. G. Richardson, of the University of Louisiana, mentions two cases briefly, that are remarkable for the shortness of the period between the bite and the outbreak of the disease. In one case it was seven, and in the other only four days ; both were young females, aged respectively eighteen and fourteen years. The locality of the bite, in both cases, was the lower limb (in one the ankle) and, taken together with the short period of latency or incubation of the disease, does not seem to favor the theory above given by M. Debove, that the manifestations of the hydrophobic symptoms will be later in appearance the greater the distance be-

tween the point bitten and the nerve-centres. One of these two cases, that in which the incubation was seven days, was treated with curare, but with the usual result. There seems to be as yet no satisfactorily assured case of recovery from undoubted hydrophobia in the human species.

At the session of the Académie de Médecine, January 18th (rep. in *La France Médicale*), M. M. Raynaud communicated, for M. Lannelongue and himself, the results of their experiments on the transmission of hydrophobia. Conveying the disease from the dog to the rabbit, the period of incubation is only fifteen days, a very valuable discovery, provided that the disease is really hydrophobia. They had experimented on some forty rabbits.

On December 8th, a child suffering with hydrophobia was brought to the Hospital St. Eugénie; the disease first appeared December 7th; the bite occurred November 11th; the incubation, therefore, was only twenty-six days. The first marked symptom was dyspnœa, and the child died four days after the onset.

Three series of experiments were performed. In the first, four rabbits were inoculated with the saliva of the child while still living; three of these quickly succumbed, the fourth recovered, after having apparently suffered severely. Two rabbits, inoculated with the blood, survived; a fact which seems to indicate that the saliva, rather than the blood, is virulent.

After the death of the child, a second series of experiments was instituted. Inoculation with bronchial mucus killed the rabbits, while a trituration of the salivary glands, introduced under the skin, gave dubious results; only one rabbit thus inoculated died. At the autopsy of the child, the ganglia of the neck, on the side of the face bitten, were strongly tumefied; and the scrapings from these ganglia killed one of two rabbits into which it was inoculated. The two roots of the trigeminus, cut close to the pons and inoculated under the skin of a rabbit, caused death at the end of three days; hence it appears that the nervous system may serve as a vehicle for the poison.

In a third series of experiments the inoculation was made from a dead rabbit to a living one. These inoculations caused death, even when the blood was used.

To sum up, out of 38 inoculations 26 were followed by death, thus seemingly proving that hydrophobia is transmissible from man to the rabbit. The interval between the inoculation and death was about 45 hours; when practised from rabbit to rabbit it averaged only 29 hours.

These observations are very difficult, as we are but little acquainted with the symptomatology of hydrophobia in the rabbit ; in many cases there was paraplegia, and convulsions occurred in eleven.

It cannot be objected that the rabbit is an animal that succumbs to the least injury, for the inoculation with saliva does not affect its health, and those operated upon died not of septicæmia, but of rabies. A very conclusive experiment would be to inoculate the dog from the rabbit with hydrophobia ; up to the present this has not been done.

In the discussion of M. Raynaud's communication, MM. Colin and Dujardin-Beaumetz doubted whether the cause of death in the rabbits was rabies ; they were inclined to consider it rather due to septicæmia. In reply, M. Raynaud recognized the force of their objections, but held that if septicæmia was the cause of death the characteristic vibrion was lacking, and he thought that M. Lannelongue and himself had sufficiently guarded against that complication. It is true that what was seen in the rabbits did not resemble the classic hydrophobia.

M. Pasteur then reported that he had experimented with the oral mucus from the same child as MM. Raynaud and Lannelongue, inoculating two rabbits, both of which died 36 hours after the operation. The saliva of these rabbits, introduced into others of the same species, also caused death. In the first ones he found swelling of the lymphatic ganglia, and in these and the trachea numerous hemorrhages. In the blood, examined immediately, he found a very peculiar microscopic organism ; a little rod, slightly constricted in the middle, and not over a thousandth of a millimetre in diameter. When placed in cultivating liquids, especially veal broth, it multiplied exceedingly, presenting the same general shape, but more pronounced, sometimes resembling the figure 8. The inoculations with these liquids produced always the same results.

Whether in these cases the cause of death is rabies is a question ; the fact of non-inoculation is worthy of consideration. It is not septicæmia, for the microscopic organism and symptoms of septicæmia are lacking. M. Pasteur was of the opinion that it is a new disease. It was not transmissible to guinea pigs, and when a dog was inoculated he died within three or four days, but not of hydrophobia.

M. Colin objected that the organism described by M. Pasteur was common in cases of septicæmia. In reply, M. Pasteur stated

that there was no animal more susceptible to septicæmic poisoning than the guinea pig, and yet he had failed to produce the disease in them by inoculation.

M. Bergeron did not believe that the rabbits inoculated succumbed to septicæmia, and yet they did not present the symptoms of hydrophobia, and he asked whether there was not a simple question of dosage.

M. Colin called attention to the change of form noticed by M. Pasteur in his organism from cultivation, and asked how we could be sure they were not new products of putrefaction. During digestion the intestines of herbivorous animals contain numerous organisms like those of charbon, and which yet do not give rise to that disease.

M. Pasteur replied that after an animal died of charbon the charbonous bacteria disappeared in proportion as putrefaction advanced, and the organisms that replaced them did not produce charbon.

M. J. Guerin noted the fact that some of M. Raynaud's inoculated rabbits recovered. These were abortive forms of disease. M. Bouley had at one time described to him the case of a girl who had the symptoms of hydrophobia in a mild form, and who recovered; her case was perhaps an abortive one of the disease.

M. Gosselin said that he would believe that M. Raynaud had inoculated rabbits with hydrophobia, only after the disease had been retransmitted to the dog in its characteristic form.

At the session of January 29th, M. Doleris reported the results of his inoculations of rabbits from the child already mentioned by MM. Raynaud and Lannelongue. He observed the following phenomena: loss of appetite, vertigo, weakness of posterior limbs, very little excitement, sometimes slight convulsions, and terminal collapse. He thought that the death in these animals was caused not by rabies, but by septicæmia, and that there are two kinds of virus, the one hydrophobic and the other septicæmic, and it was difficult to determine the proper conditions for the production of one rather than the other.

The following are the titles of certain papers recently published on the pathology of the nervous system and mind and pathological anatomy.

MANN, Removal of both Ovaries for Hystero-Epilepsy without Controlling the Convulsions; Rapid Improvement under Central

Galvanization, etc. *N. Y. Med. Jour.*, Jan. BENEDIKT, On the Question of the Four Frontal Convolutions Type. *Centralb. f. d. Med. Wissensch.*, No. 46, 1880. MANCINI, Cerebral Localizations and especially Aphasia. *Lo Sperimentale*, Oct. BROWN-SEQUARD, Remarks on some of the Physiological and Pathological Influences of the Nervous System on Nutrition. *Brit. Med. Jour.*, Dec. 11. HUTCHINSON, On Structure of Peripheral Organs. *Nordiskt. Med. Arkiv*, Bd. xii, 1880, No. 26. FÜRST, The Nerves of the Iris. *Nordiskt. Med. Arkiv*, xii, 1880, No. 19. CHAPMAN, The Brain of the Orang. *Science*, Dec. 31.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

ARSENIC IN TETANUS.—Dr. John T. Hodgen reports (*St. Louis Courier of Medicine*, December 9th) a case of traumatic tetanus following a compound comminuted fracture of the os calcis and a comminuted fracture of the thigh, from a fall. The treatment was commenced with the hypodermic injection of ten drops, Fowler's sol., the use of chloral, thirty grains of chloral every hour, till three doses had been given, and then it was discontinued, and the injections of arsenic alone depended upon, and given at intervals of four hours. Under this treatment the tetanic symptoms disappeared, but the patient died of septicæmic poisoning from his wound three weeks after the injury.

No bad effects were experienced from the use of the arsenic or the method of its administration, not even nausea, and the injections appeared to promptly relieve the rigidity, substernal pain, the difficulty of deglutition, and also controlled the small, quick, and fluttering pulse. The patient asked himself for their repetition.

NERVE-STRETCHING.—In addition to the cases noted in our previous issues, there have been reported in the service of M. Debove two new cases in which nerve-stretching has had the happiest effects in locomotor ataxia. In the first case (*Progrès Médical*, No. 50, 1880) the patient was entirely relieved by the operation of his ataxic pains, and the gastric attacks and incoördination also disappeared almost or quite entirely. The second patient having observed these effects in the person first operated upon, demanded to have the same performed on himself. The fulgurant pains were most troublesome in the arms, and therefore the

operation was performed on the median and radial nerves of the right side. The immediate results, as stated by M. d'Olier in the *Progrès Médical*, No. 52, were a considerable diminution of the pains in the right arm, and their disappearance in the left and in the legs, diminution of the plantar anæsthesia on the left side, and marked improvement in coördination, so that the patient was able to walk unsupported, which could not be done previously. There was also improvement in other respects; the patient regained his regular, undisturbed sleep, and refused anodynes, after the operation, as needless.

This operation, judging from these and the other cases reported, seems likely to make locomotor ataxia a surgical disease, as far as therapeutics are concerned, and they go far to give an altogether different face to its prognosis. We shall await further observations and experience with this method of treatment with the greatest interest.

At the session of the Soc. de Biologie, February 5th (rep. in *Le Progrès Médical*), M. Laborde exhibited two guinea pigs in which he had stretched the sciatic nerve, and he concluded from his experiments that if the operation was thoroughly done it caused the complete disappearance of the sensitive current. In fact, in these guinea pigs he pinched the two external phalanges, innervated, as is well known, by the sciatic, and they remained unmoved; but if he pinched the same part of the corresponding limb in which the nerve had not been stretched, he immediately produced pain and reflex movements, extending to the other limb. The descending nerve-current is therefore preserved; and, for a further proof, the two internal phalanges of the limb operated on, which are innervated by the crural nerve, preserved their sensibility intact. These results are permanent, both in the rabbit and in the dog. M. Laborde had examined at the Bicêtre the patient on whom M. Debove had first operated, and in whom the fulgurant pains had disappeared since the operation. But, besides this effect, the conscious and reflex sensibility in this patient were notably different on the two sides. On the side operated upon, the sensibility and the reflexes were notably enfeebled. This is a valuable fact, since it agrees with the results of experimentation on the lower animals. It appears necessary, therefore, in nerve-stretching to continue the traction till the sensibility is markedly affected.

PURGATIVES IN TETANUS.—Dr. Alfred Bron (*Practitioner*, December) protests against the customary employment of active

purgation in the treatment of tetanus, and which is recommended in all, or nearly all, the treatises on the disease. In the course of a rather extensive experience with tetanus in the West Indies, he began with the usual practice in this respect, and with uniform ill success. In many cases he observed that when a patient was apparently doing well, the administration of a powerful purgative would be followed by an exacerbation of all the bad symptoms, and speedy decease. Since then he has abandoned the use of these agents, and has had the satisfaction of seeing a large proportion of his cases recover.

He is satisfied that in a large proportion of cases of this disease the bowels may be safely let alone, to act of their own accord, and the patient be the better off for being spared this source of irritation. Only in those cases in which there is abdominal distress, different from the usual epigastric pain of tetanus, and a desire to go to stool without ability to pass fæces, does he advise the use of laxatives; and in these cases he recommends only the milder laxatives, and the only one he has used in such cases and can recommend is castor oil, in drachm doses, at pretty frequent intervals; it acts without producing abdominal irritation, but it is well to add a few minims of tincture of hyoscyamus to each dose. He says, in conclusion, that he has never had occasion to regret not having purged a patient in tetanus, but he more than once had occasion to repent for having followed the time-honored practice of the text-books.

HOT-WATER COMPRESSES IN TETANUS.—Dr. C. H. Spörer (*St. Petersb. Med. Wochenschr.*, Oct. 2d) recommends the use of hot-water compresses in the treatment of tetanus. He reports three cases: one traumatic, one connected with rheumatism, and one very complicated case of cerebro-spinal meningitis, in all of which these applications produced great and lasting relief, which he is not inclined to attribute to any other of the measures employed.

His method of application is simple. He wrings out a suitable piece of flannel with water as hot as can be borne by the naked hand, and applies it along the whole spine, from the occiput to the sacrum. The temperature of the water by the thermometer should be from 122° F to 131° F. This application in his cases showed its effects, in each case, in five or ten minutes, in relieving the tetanic attacks.

CONIUM.—A communication from M. Bochefontaine was presented to the Acad. des Sciences, Paris, in October last (rep. in *L'Union Médicale*), on the physiological action of conium. In 1878, in connection with M. Tiryakian, he had communicated to the Academy some results of experiment from which they had deduced that there existed in conium maculatum two active principles, one of which, coniine or conicine, had the action attributed to hemlock, and the other, an action somewhat like that of curare. Since then, in July, 1879, M. Prevost (of Geneva) had published the conclusions of a memoir tending to show that the paralysis caused by bromohydrate of conicine was due to its action on the motor nerves. Their results being different, it appeared necessary to M. Bochefontaine to seek the reasons for this difference, and he therefore commenced a new series of experiments on the physiological and therapeutical action of coniine. The following are the results :

Coniine is absorbed by the mucous membrane of the digestive tract in man, as in the dog, and it produces a general enfeeblement and the disappearance of severe stomachal pains. A few drops of this alkaloid, applied directly to certain mucous membranes, act directly as an analgesic, and even causes sleep for many hours. Curare does not have this effect.

The experiments from which the other differences between the alkaloid of hemlock and curare were shown were as follows :

1. Into the saphenous vein of a large, healthy dog, after having divided the sciatic nerve, he injected about seven centigrammes of coniine in a convenient hydro-alcoholic solution. The reflex activity of the medullary spinal gray axis was speedily abolished, and faradization of the central portion of the divided nerve caused neither manifestations of pain nor reflex movements, or, more exactly, it did not, as before the injection, cause either movements of the head or members or cries, while excitation of the peripheral portion still produced its usual effects.

May we not here also cite a characteristic difference between our alkaloid and curare, noticed by Mm. Jolyet and Pelissard, and then by M. Prevost ; the former paralyzing the vagus before any other nerves, thus reversing the action of curare.

2. In two frogs we cut across the sacrum, and tied the trunk in its lower part, with the exception of the sciatic plexus. Then in one a drop of curare was injected under the skin of the anterior limb, and in the other the same quantity of a suitable solution of coniine. As the two animals lay flaccid, when we pinched the

digits of the intact fore limb of each, or touched the skin of the axilla of one side, or around the anus, with a drop of acid, the curarized frog made the motions of defence or flight with the posterior limbs, while the other remained immovable.

From these it follows that coniine diminishes or destroys the physiological functions of the nerve-centres before it acts like curare on the "nervo-muscular connections" (Vulpian). In both dogs and frogs it finally abolishes the nervous motor excitability, if given in sufficient amount; but then it is inevitably fatal for frogs as well as mammals. The physiological action of this alkaloid is therefore different from that of curare.

As to the action of the bromohydrate derived from conium, the following are the results of experiments with the products crystallized in the same general form and prepared by M. Mourrut, mainly in M. Vulpian's laboratory.

We may divide these bromohydrates into two groups:

a. These have an amber color and resemble samples formerly used by M. Tiryakian and myself. These, more toxic than those of the next group, act very much like coniine, they represent the principal physiological action of that alkaloid.

b. The second group, colorless or slightly pearly, purified by many crystallizations, and similar to that used by M. J.-L. Prevost, are shown to be less toxic than the yellowish salts, and act differently from them. Frogs paralyzed by from 15 to 20 milligrammes of these purified bromohydrates lose their motor excitability like curarized frogs, but do not recover, like those benumbed with curare and otherwise placed in the same conditions. A little smaller dose, sufficient, nevertheless, of incompletely benumbing frogs, so that they can still execute some spontaneous movements, will yet produce death after two or three days.

To the query whether these alkaloids differ chemically or not, an answer cannot yet be given.

As regards the comparative action of hemlock and curare, it can be apparently formulated thus: *Hemlock may act like curare, but it causes still other physiological effects not observed in curarized animals.*

ACTION OF DIGITALINE ON THE BLOOD-VESSELS AND THE HEART.—F. Klug (*Archiv f. Physiologie*, 1880, p. 457), after quoting the rather contradictory literature on the subject, records his results. Examining, in the first place, the muscles of the frog,

he found that digitaline diminishes gradually excitability of the skeletal muscles until paralysis sets in.

On the nervous system it acts in an inverse manner, at first increasing the irritability, and, after directly irritating, secondary depression and ultimate paralysis follow.

One milligramme of digitaline is hardly sufficient to kill a frog (*Rana esculanta*). The agent further stimulates the muscular tissue of the blood-vessels, and thus causes persistent muscular spasm of peripheral origin; hence the blood-pressure rises. In larger doses it produces a temporary irritation of the vagus centre, without destroying finally the irritability of that nerve. The blood-pressure will at last sink on account of feeble cardiac action. This is due to the direct influence of the alkaloid upon the heart muscle, and cannot be stopped by irritation of the vagus. The heart stops finally in systole.

The results on mammals the author condenses into the following conclusions: Digitaline acts less energetically upon the blood-vessels of the rabbit than upon those of the dog. In small doses it raises the blood-pressure. In larger quantities it influences the cardiac activity. Large quantities check the heart by irritation of the vagus centre. This condition is but temporary. When it ceases there follows no paralysis of the vagus. The heart will finally beat abnormally fast from increased activity of the accelerating ganglia. Death is caused by paralysis of the central nervous system. The rise of blood-pressure is due to the combined action upon the vaso-motor centre and the muscular walls of the vessels. The latter influence accounts for the rise of blood-pressure even after dissection of the spinal cord.

THE ACTION OF ANÆSTHETICS.—The *British Med. Journal* of December 18th, contains an elaborate report, by the Scientific Grants Committee of the British Medical Association, on the action of anæsthetics, by a committee consisting of Drs. J. G. McKendrick, Joseph Coats, and David Newman. The report is illustrated by graphic tracings and cuts of the apparatus, and contains elaborate discussions on the points involved. The subjects of the experiments were frogs and rabbits, and, as will be seen, the more special subject of investigation was the comparative action of chloroform, ether, and ethidene dichloride. The results, which alone we have the space to give, are summed up as follows:

A.—*Clinical.*

I. The dose (administered on a towel) is greater with ethidene

than chloroform ; but the time necessary to anæsthetize the patient is longer with the latter than the former agent.

II. The number of cases of sickness and vomiting is about the same with the two agents, but the duration is considerable protracted in the case of chloroform ; the occurrence of these symptoms have no relation to the length of time the patient has been under, or reference to the quantity of anæsthetics administered in a given time.

III. With both agents, the pulse-respiration ratio is considerably altered in a certain number of cases, the pulse falling as the respirations increase in frequency. With chloroform, this change is not only much more marked, but its occurrence is also more frequent than with ethidene : the proportion, in our experience, being nine of the former to two of the latter. There is also a greater tendency, in cases of chloroform, to retardation of the heart's movements, and to dicrotism.

B—*Physiological.*

I. The effect of anæsthesia with chloroform is to increase the amount of carbonic acid exhaled in a given time. The results of our investigations, in connection with the effects of anæsthetics on the gases of the blood, are not sufficiently reliable to permit us to give results.

II. Both chloroform and ethidene, administered to animals, have a decided effect in reducing the blood-pressure ; while ether has no appreciable effect of this kind.

III. Chloroform reduces the pressure much more rapidly, and to a greater extent, than ethidene.

IV. Chloroform has sometimes an unexpected and apparently capricious effect on the heart's action, the pressure being reduced with great rapidity almost to *nil*, while the pulsations are greatly retarded, or even stopped. The occurrence of these sudden and unlooked for effects on the heart's action seems to be a source of serious danger to life—all the more that, in two instances, they occurred more than a minute after chloroform had ceased to be administered, and after the recovery of the blood-pressure.

V. Ethidene reduces the blood-pressure by regular gradations, and not, so far as observed, by these sudden and unexpected depressions.

VI. Chloroform may cause death in dogs either by primarily paralyzing the heart or the respiration. The variations in this

respect seem to depend, to some extent, on individual peculiarities of the animals : in some, the cardiac centres are more readily affected; in others, the respiratory. But peculiarities in the condition of the same animal very probably have some effect in determining the vulnerability of these two centres respectively; and they may both fail simultaneously.

VII. In most cases, respiration stops before the heart's action; but there was one instance in which respiration continued while the heart had stopped, and only failed a considerable number of seconds after the heart had resumed.

VIII. The use of artificial respiration was very effective in restoring animals in danger of dying from the influence of chloroform. In one instance, its prolonged uses produced recovery even when the heart had ceased beating for a considerable time.

IX. Under the use of ethidene, there was, on no single occasion, an absolute cessation either of the heart's action or of respiration, although they were sometimes very much reduced. It can, therefore, be said, that, though not free from danger on the side of the heart and respiration, this agent is in a high degree safer than chloroform.

X. In regard to the effect of anæsthetics upon the pulmonary circulation, as in the experiments on the effects of the anæsthetics upon the blood-pressure, it may be stated that chloroform produces the most immediate effect, ether the least, while ethidene occupies an intermediate position.

XI. The quantity of air and the length of time required to restore the circulation in the lung, are in an inverse ratio to the amount of anæsthetic vapor and the time necessary to stop it.

XII. The changes produced in the lung are the same in all; the only difference being in the rapidity of their occurrence.

XIII. The anæsthetics produce the following changes in the lungs : (1) retardation and ultimate stoppage of the circulation in the lung, first in the capillaries, then in the arterioles, and subsequently in the larger vessels; (2) the epithelium cells of the meshes and their nuclei are no longer apparent; (3) the capillaries contract slightly, and their walls become less distinct, or even disappear from view, and the enclosed corpuscles may become more or less disintegrated.

XIV. The effect of ether and ethidene upon the heart, after artificial respiration for seven and five minutes respectively, is simply to produce a retardation of the impulses—ethidene having the most marked effect. Chloroform not only produces a retar-

dation of the pulse, but the ventricular contractions are delayed and slightly separated from the auricular, and an auricular contraction may immediately follow the ventricular. The auricular contractions frequently occur without any corresponding ventricular movements.

C.—*Practical.*

The conclusions to be drawn from the above observations are these :

I. It is not only necessary to watch the effect of the anæsthetic upon the pulse, but it is also requisite to have regard to the respiration. We must not only take into account the danger of sudden stoppage of the respiration, but must also remember that in the event of abnormal increase of respiratory movements, it may become essential, for the safety of the patient, to temporarily discontinue the administration.

II. Owing to the tendency of chloroform and ethidene—particularly chloroform—to reduce the blood-pressure suddenly, not only during the administration of these agents, *but also after they have been stopped for some little time* (a source of serious danger), it is necessary for the person who has charge of the administration of the drug to be on the lookout for symptoms of this occurrence, both during the time the agent is being given, and for some time after the patient has recovered from its more evident effects.

III. The danger of death from stoppage of the respiratory functions must be borne in mind in every case in which anæsthetics are given ; but of perhaps greater importance is the danger from interference with the proper action of the heart—particularly when it is remembered that, by artificial means, we can combat the former contingency. It might even be advisable, in certain cases, to introduce a tracheal-tube by the mouth, so as to enable us to force air into the lungs by means similar to those adopted in experiments with animals ; or, in circumstances where such a procedure was impracticable, tracheotomy might be performed with the same object in view. Artificial respiration should be continued, even though all evidence of cardiac action has ceased.

IV. As regards comparative danger, the three anæsthetics may be arranged in the following order : chloroform, ethidene, ether ; and the ease with which the vital functions can be restored may be conversely stated thus : the circulation is more

easily reëstablished when the cessation is due to ether than to ethidene ; and when the result of ethidene, than when chloroform has been used. The advantages which chloroform possesses over ether—in being more agreeable to the patient, and more rapid in its action, in the complete insensibility produced by it, and the absence of excitement or movements during the operation—are more than counterbalanced by its additional danger.

V. The chief dangers are : (1) sudden stoppage of the heart ; (2) reduction of the blood-pressure ; (3) alteration of the pulse-respiration ratio ; and (4) sudden cessation of the respiration. The danger with ether approaches from the pulmonary rather than from the cardiac side, so that, by establishing artificial respiration, we have a means of warding off death. Its disadvantages are, to a great extent, obviated by the use of ethidene ; whilst the dangers of chloroform are also reduced to a minimum.

The committee propose, in case it is thought best to continue the investigations, the following lines of future research : 1. Specific action of anæsthetics upon the heart ; to determine whether they act (*a*) on ganglia, (*b*) muscular protoplasm, or (*c*) on both. 2. The action of anæsthetic agents on the medullary centres ; (*a*) cardiac, (*b*) respiratory, (*c*) vaso-motor. 3. Specification of anæsthetics on pulmonary tissue.

The committee now feel that it is unnecessary for them to undertake clinical observations, except in the way of taking simultaneous tracings of the pulse and respiration ; and for this purpose they have devised a special apparatus. They suggest that schedules similar to one published in their report be distributed all over the world to collect information. They are especially desirous of information from America, as the statistics of ether-administration in England are not sufficiently numerous for purposes of comparison.

THE VALUE OF HOMATROPINE HYDROBROMATE IN OPHTHALMIC PRACTICE.—In a paper on this subject in the January number of the *American Journal of Medical Sciences*, Dr. S. D. Risley draws the following conclusions :

1. That homatropine hydrobromate in solutions of two, four, and six grains to the ounce is competent to paralyze the accommodation.

2. That in from sixteen to thirty hours this paralysis entirely disappears.

3. That dilatation of the pupil accompanies the paralysis and is more persistent, the probable duration being forty-eight hours.

4. That it is more liable to produce conjunctival irritation than atropia or duboisia.

5. That it produces far less constitutional disturbance than either of the old mydriatics.

CURARE.—M. G. Planchon (*Journ. de Pharm. et de Chim.*) says that, so far as our present knowledge extends, there are four different sections of northern South America where curare is prepared, and in each of these sections a different kind of *strychnos* is used as the source of the poison. These four sections, from west to east, are the following: 1. The region of the upper Amazon, the largest of all, comprising the rivers Solimoeus, Javiri, Ica, and Yapura. It furnishes the curare of the Ticunas, Pebas, Yaguas, Oregones. This is prepared from *Strychnos Castelnæana* (Wedd). 2. The region of the upper Orinoco to the Rio Negro. This contains the district visited by Humboldt in 1880. It furnishes the curare of the Maquiritaras and Piaroas, which is derived from *Strychnos gubleri*. 3. The region of British Guiana, furnishing the curare of the Macusis, Orecumas, and Wapisianas. This is derived from *Strychnos toxifera*, Schombemsk including *Str. Schomburgkii* Kl. and *Str. cogens* Benth. 4. The region of upper French Guiana furnishing the curare of the Trios and Rouconyennes, which is derived from *Str. Crevauxii*.—*British Med. Journ.*, Jan. 22, 1881.

THE ACTION OF ACONITIA.—B. Van Aurep (*Archiv f. Physiologie*, supplement, p. 161) examined three varieties of the alkaloid, the German, the English, and Duquesnel's crystalline preparation. Between the German and English there exist only quantitative differences. Doses of 0.05 milligramme of the former variety is fatal to the frog, while 0.2 milligramme of the English is necessary. The striking symptom is paralysis, preceded by symptoms of irritation. There exists an abnormal secretion of the skin, followed by dryness and a change in color toward black. The pulse is at first increased in frequency, especially with small doses. This is not due to the paralysis of the vagus, although this does occur, but the acceleration is much greater than can be produced by section of the vagus. The acceleration is followed by slacking and debility of the cardiac action. Before the heart is completely paralyzed there is often a stage of tumultuous, almost tetanic,

action, which may be called cardiac spasm. The sensory nerves diminish in irritability when under the influence of aconitia, but it requires large doses to paralyze them. The motor nerves are apparently not affected. Early loss of coördination and immobility of the animal are due to the depressing effect upon the brain.

The agent causes very decided dyspnœa, in large doses even stoppage of breathing. The effect is due to the action upon the respiratory centre. Clonic spasm and fibrillary contraction complete the description.

Duquesnel's crystalline aconitia has only been tested by Duquesnel and Gréhaut. The authors observed an effect, from small doses, resembling curare. Aurep could confirm this curare-like action, but found it feeble. The agent seemed more poisonous than the other varieties of the alkaloid; 0.02 to 0.03 milligramme are fatal to frogs. The symptoms resembled those produced by the other variety, but the crystalline preparation seems more irritating locally. It differs in its action on the heart by not accelerating it at first, and by not producing spasm. Its paralytic action on the heart is the same as that of the other varieties. No other striking differences are observed.

On mammalia the three varieties act alike. The Duquesnel's aconitia is fatal to rabbits in the dose of one-fourth milligramme, and to medium-sized dogs at double that quantity. It is hence the most poisonous of all known substances. The other varieties require two to four times the dose. Death seems to be caused by cardiac paralysis, but the experiments on mammalia were not extensive.

ERGOTINE, ITS DRAWBACKS AND DANGERS.—Dr. Boissarie (de Sarlet), in a note read at a recent meeting of the Paris Surgical Society (*Annales de Gynéc.*, June, 1880), draws attention to the possible dangers attending the prolonged administration of ergotine, particularly when given by the mouth. After briefly alluding to the great and varied utility of this energetic drug, he refers to the experience of M. Debove. This gentleman lately reported to the Hospital Medical Society the case of a young woman, æt. 25, suffering from albuminuria, who developed a gangrene of both inferior extremities. This gangrene had followed treatment by ergotine, extending over four weeks, during which time a daily dose of 0.02 had been administered. Although a month had elapsed between the cessation of the drug and the

appearance of the gangrene (and contrary to the opinion of M. Debove), the writer thought that the two events stood in causal relation to each other.

M. Dujardin-Beaumetz had also observed the supervention of gangrene, in a case of typhoid fever subjected to treatment by ergot of rye. The dose in this case was 1.0 daily, continued one month.

The author's case was that of a child, *æt.* 13, which, while in excellent general health, began to suffer from incontinence of urine. After having tried various drugs, without benefit to the patient, ergot treatment was commenced. Hypodermic exhibition of the medicine being refused, a daily dose of about 0.2 (= about 3 grains) was given by the mouth. At first the results of this treatment appeared to be marvellous, the incontinence being completely relieved for several days. But soon the old troubles reappeared, and after continuing the ergot for two months more without apparent benefit, the medicine was stopped. This was about February 20th. During all this time ill effects of the ergot had never been observed. On March 2d, however, the child began to complain of pains in the left side, general malaise was noticed, and the child seemed prostrated and was feverish. On the following day, the pulse ranged at 110, the pains persisted, occasional crepitant râles posteriorly. On the morning of March 4th, the expectoration became extremely fetid. The sputa were raised with painful efforts, appeared of a grayish color, were thick and profusely abundant. The condition of the child grew worse from day to day, the pulmonary gangrene spread, on the 10th the sputa showed plentiful sanguineous admixture. Later the hemorrhage became profuse, and on the 15th it became fatal. This abrupt appearance of acute pulmonary gangrene is ascribed by the author to the influence of the ergotine, and the fact is pointed out that in this case also, as in that of M. Debove, some time had elapsed after cessation of the drug before evil symptoms were first noticed. It seems, therefore, that the action of this powerful drug is truly a cumulative one; that it has the property of causing, sooner or later, a sudden explosion of formidable accidents, and that, therefore, new physiological researches are needful to explain the mechanism of its action. According to Dr. Boissarie, the principal conclusion to be derived from his observation is, that we should learn to abandon, more and more, the oral exhibition of ergot, and substitute in its place hypodermic administration of the drug. And

also that, when the latter method is inadmissible, to use smaller doses by the mouth, and avoid a protracted course of the medicine when so administered.—*Am. Jour. Obst.*, January.

THE ACTION OF ANÆSTHETICS ON THE REFLEXES.—The following is a translation of a short article in the *Centralblatt für die Medicinischen Wissenschaften*, No. 6, by Dr. Eulenburg, of Greifswald :

The narcosis produced in warm-blooded animals (dogs, rabbits) by the inhalation of the anæsthetic agents is accompanied by numerous different conditions of the reflex irritability. This may be increased or diminished ; it may also be extraordinarily varied, either quantitatively or qualitatively, or in relation to their succession in time in the different single reflexes and reflex groups (respectively, the tendon, periosteal, and fascial reflexes, those of the skin, cornea, conjunctiva, and iris). Besides minor varieties, we can determine the following principal types of their effect on the reflexes :

1. Certain anæsthetics (chloroform) produce, generally in the beginning of this action, a transient increase of certain reflexes (patellar reflex in dogs and rabbits), followed by their diminution and disappearance. The patellar reflex is always lost perceptibly before the corneal ; the disappearance of the latter generally occurs with the appearance of myosis and rigid pupil. *Vice versa* the corneal always reappears perceptibly earlier than the patellar reflex with the disappearance of the narcosis. The same phenomena are regularly observed in man under the influence of chloroform. But in man the nasal reflex always persists still longer than the corneal one, agreeing in this completely with the observations of O. Rosenbach on children in natural sleep. The nasal reflex in both these conditions disappears when the hypnosis is most complete. The condition of the patellar reflex is sufficient guide for operative purpose in chloroform narcosis.

2. Other anæsthetics (ether, and, to a less degree, certain ethyl combinations) when inhaled, frequently cause an enormous increase of certain reflexes (sinew or periosteal reflexes ; patellar, tibial, and foot reflexes in rabbits). These phenomena may, indeed, continue after the cessation of the narcosis. The corneal reflex is, at a rather late stage of ether narcosis, weakened, rarely entirely suppressed.

3. Other anæsthetics (especially the double chloride combinations—ethyl-chloride, ethylid-chloride, methyl-chloride) produce,

when inhaled, in dogs and rabbits, loss of the reflexes (without previous exaltation), and, indeed, the corneal here always disappears before the patellar reflex, and the latter always reappears before the former on the recovery from the narcosis. Here we may recall that Liebreich attributes to these agents a primary anæsthetic effect upon the sensory cranial nerves, and also that, according to my own observation, the corneal reflex disappears in asphyxia some time before the patellar reflex, as a rule.

4. Still other anæsthetics (for example, bromide of ethyl), when inhaled, affect the reflexes scarcely at all, or very slowly; the patellar reflex is gradually diminished without any previous rise; the corneal reflex becomes weaker, but is rarely altogether suppressed. Bromide of ethyl acts somewhat like ether; the different behavior may be attributed to the fact that ethyl bromide is decomposed in alkaline blood with the formation of soluble bromine; after inhalation of large quantities, bromine, in combination with an alkaline metal, is found in the urine.

According to these experiments the participation of the reflex apparatus stands in no definite connection or only in a sort of time-relation to the involvement of the psychomotor and psychosensory centres by the action of the anæsthetic. The degree of the narcosis and the extent of the anæsthesia are not at all proportional to the condition of single reflexes or reflex groups. The successive attacks on the separate cerebral and spinal reflex centres are throughout dissimilar with different anæsthetics. The relation with the commonly used hypnotics and sedatives is also dissimilar. Morphine, given hypodermically to the extent of 0.5 (= 7 grains) to rabbits and dogs, has but little effect on the reflexes, and morphine injected at the beginning of, or during the administration of the anæsthetic has no effect on the action of the latter in this respect. (In subjects of the morphine habit who used very large doses, I found the tendon reflexes perfectly unaffected.) Chloral hydrate, given to the extent of from 1.25 to 1.5 (= 18-22 grains) to rabbits, hypodermically, acted very similarly to chloroform, but without the primary exaltation of the reflexes; the patellar reflex gradually disappeared while the corneal reflex, in non-fatal cases, was generally retained, though diminished. Of the bromides, the potash salt, given subcutaneously to rabbits, in doses of 1. to 2. (= 15-30 grains), caused an initial increase of the patellar reflex followed by a decrease. Bromal hydrate and bromate of quinine exhibited no definite effects. The fatally-ending cases are excluded from considera-

tion. In so far as death resulted from asphyxia, the corneal reflex disappeared, as a rule, a little before the patellar, the latter being generally lost just previous to the exophthalmus, dilatation of pupils, and terminal dyspnœic convulsions.

ALCOHOL.—The following are the conclusions of a paper by Dr. J. D. Castillo, U. S. Navy (*Phila. Med. Times*, Oct. 23, 1880), based on some fifty odd separate experiments on drugs, etc. :

1. That alcohol, in small doses, causes an acceleration of the pulse, with increased cardiac force.
 2. That this acceleration of the pulse, and the increase of the cardiac force, are due to a direct stimulation of the heart.
 3. That alcohol, in larger doses, causes an acceleration of the pulse, with diminished cardiac force, and that this is due to a direct depression of the heart.
 4. That if the dose be excessive, the pulse-rate is diminished from the first, or the heart may be immediately arrested, being due to a direct paralysis of the heart.
 5. That the heart is always arrested in diastole.
 6. That small doses cause a rise of the arterial pressure.
 7. That large doses cause a fall of the arterial pressure.
 8. That these changes effected in the arterial pressure are due to the action of alcohol on the heart alone ; in the former case, being one of stimulation, and, in the latter, one of depression.
 9. That alcohol in small doses is a cardiac stimulant, and, in large doses, a cardiac depressant.
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ABSINTHISM.—At the session of the Acad. de Médecine, Paris, Oct. 19, 1880 (rep. in *La France Médicale*), M. Lancereaux made a communication, in which he claimed that the effects of the use of absinthe did not reveal themselves solely in the acute and transient symptoms, such as convulsive phenomena, etc., following excess. It produced, when long continued, a series of gradually- and regularly-developing symptoms of intoxication, profoundly modifying the system, and often causing death. These symptoms, which affect especially the sensory and mental faculties, constitute what he calls the chronic type of absinthism, as opposed to the acute form.

There is still another form of intoxication, the hereditary type of absinthism. Each of these forms has great analogies with the pathological condition known as hysteria. The acute type recalls

the convulsive hysteric attack ; the second presents, in the male as well as in the female, disorders of sensibility, which it is impossible to differentiate from those of hysteria. Therefore, he believes that many of the so-called cases of hysteria in males (in France), are really only cases of chronic absinthism. The third of these forms is generally confounded with hysteria.

THE TREATMENT OF ALCOHOLISM.—Dr. J. K. Bauduy (*St. Louis Courier of Medicine*, Dec., 1880) deduces the following conclusions from a study of over eight hundred cases of alcoholism under his observation at St. Vincent's Asylum, St. Louis :

1. Acute alcoholism is a self-limiting affection.
 2. Acute alcoholism results, not from sudden withdrawal, but from excess and abuse of alcoholic "so-called stimulants," better called sedatives and narcotics in the doses in which they are taken.
 3. The expectant plan of treatment is the most successful.
 4. Opiates are dangerous, because they additionally derange digestion, and, acting as powerful cardiac sedatives, tend to paralyze the heart, and, finally, because they check elimination, interfere with the normal secretions and digestion.
 5. Sleep is never to be produced at risk or hazard to the patient, but is to be expected as one of the harbingers of a convalescence not to be forced.
 6. In acute alcoholism, as in many other acute diseases, the *vis medicatrix naturæ* is fully adequate, in most cases, to produce the happiest of results.
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ELECTRICITY.—Dr. Mossdorf, in a paper offered to the *Gesellschaft. Natur u. Heilkunde*, at Dresden, April 3, 1880 (rep. in *Deutsche Med. Wochenschr.*, Dec. 11), recommends strongly the use of the constant current in those cases of diphtheritic paralysis that call for treatment. He uses the descending spinal current alone ; its effects, he claims, are remarkable, not only relieving the paralysis, but acting as a general tonic to the patient. It has the advantage also of causing no pain or inconvenience, even to a child, in its application.

Of course, though he says nothing as to the strength of the current, the general rule of caution should be observed.

Dr. Roberts Bartholow, in a clinical lecture published in the *Medical News and Abstract* for January, says, that in treatment

with electricity, not enough attention is paid to the durations and frequency of the applications. Galvanic applications about the head should be with moderate currents, should not last over five minutes, and may be repeated several times—say three a day. In neuralgias the *seances* should be of longer duration, and should be repeated at short intervals. Thus, he says, much better results would be obtained in sciatica, for example, than is usually the case, if they were each fifteen minutes long, and were repeated every three or four hours. In the treatment of muscular paralysis, however, with faradism, the care must be to avoid fatigue of the muscles, and the smallest current that will cause contractions may be used from five to fifteen minutes twice a day. He says he has had experience with these frequently-repeated applications in neuralgias, etc., and his statements are based upon this experience.

Among others, the following may be mentioned as recent publications on the therapeutics of the nervous system and mind :

BEARD, The Asylums of Europe. *Boston Med. and Surg. Journ.*, Dec 23. BRIQUET, Metallotherapy, and the Treatment of Disorders of Sensibility in Hysterical cases by Electricity. *Bull. gén de Therap.*, Nov. 30, 1880. WALSHAM, A Case of Epileptiform Neuralgia Cured by Stretching the Infra-orbital Nerve : with Remarks. *Brit. Med. Journ.*, Dec. 25th. KANE, Chloral Hydrate. *N. Y. Med. Rec.*, Dec. 25th, Jan. 1st, Jan. 8th, Jan. 15th. STEPHEN SMITH, Partial Intoxication in the Prevention of Shock during Operations. *N. Y. Med. Rec.*, Dec. 25th. CROTHERS, Clinical Studies of Inebriety. The Treatment of Inebriety Empirically. *Med. and Surg. Rep.*, Feb. 5th. KANE, Chloral Hydrate as an Antidote to Strychnia. *Ibid.*, Jan. 29th. POOLE, Electricity a Paralyzing Agent. *N. Y. Med. Rec.*, Jan. 29th. DAVIES, Chemical Restraint and Alcohol. *Jour. of Ment. Sci.*, Jan. 1881. POOLE, Strychnia a Paralyzing Agent. *N. Y. Med. Rec.*, Feb. 19th. ENGELHORN, On General Faradization. *Centralbl. f. Nervenheilk*, Jan 1st. HUGHES-BENNETT, On the Action of the Bromides in Epilepsy. *Edinburgh Med. Jour.*, Feb.

BOOKS AND PAMPHLETS RECEIVED.

Contributo allo Studio delle Malatie Accidentali dei Pazzi. Dei Dottori Seppilli, Guisepppe, e Riva, Gætano. Milano, Fratelli Rechidei Editori, 1879.

Di Alcune Eruzioni Cutane Dovute all'Azione Patogenica dell'Ioduro di Potassio pel Dott. Celso Pellizzari. Firenze, Tipografia Cenniniana, 1880.

Rocky Mountain Health Resorts, by Chas. Denison, M.D. Boston, Houghton, Mifflin & Company, 1881.

Aphorisms in Fracture, by R. O. Cowling, A.M., M.D. (Morton's Pocket Series, number 2.)

Cerebral Anatomy Simplified, by S. V. Clevenger, M.D. (Reprint from *Chicago Medical Journal and Examiner*, November, 1880.)

The Results of Treatment in over Eight Hundred Cases of Alcoholism, by J. K. Bauduy, M.D. (Reprint from *St. Louis Courier of Medicine*, December, 1880.)

Hemiopia, by Wm. Dickinson, M.D., St. Louis. (Reprint from *Alienist and Neurologist*, Jan'y, 1881.)

The Asylums of Europe, by Geo. M. Beard, M.D. (Reprint from *Boston Medical and Surgical Journal*, Dec. 23, 1880.)

The Relations of Goitre to Pregnancy and Derangements of the Generative Organs of Women, By E. W. Jenks, M.D. (Reprint from the *American Journal of Obstetrics*, January, 1881.)

Phthisis Pulmonalis and its Treatment with Hypophosphites, by L. de Brémon, M.D., University of Paris (France), 1880.

Spinal Myosis and Reflex Pupillary Immobility, by William Erb, M.D. (Reprint from *Archives of Medicine*, October, 1880.)

Tracheotomy in Croup and Diphtheria, by Drs. E. W. Lee and Christian Fenger. (Reprint from *Chicago Medical Journal and Examiner*, October, 1880.)

Caries of the Superior Maxilla, by T. W. Brophy, M.D., D.D.S. (Reprint from *Chicago Medical Journal and Examiner*, December, 1880.)

Comparative Neurology, by S. V. Clevenger, M.D. (Reprint from *American Naturalist*, January, 1881.)

Suggestions for Improvements in the Management of the Insane and of Hospitals for the Insane in the State of New York, by Wm. A. Hammond, M.D.

A Contribution to the Doctrine of Bilateral Functions after Experiences of Metalloscopy, by A. S. Adler, M.D. (Reprint from *San Francisco Western Lancet*, Feb'y, 1881.)

The Cardiac Nerves Tabulated, by Roswell Park, A.M., M.D. (Reprint from *Annals of Anatomy and Surgery*, 1881.)

An Inner View of the State Lunatic Asylum at Utica, by William L. Trull.

Transactions of the Eleventh Annual Session of the Medical Society of Virginia, 1880.

Proceedings of the Louisiana State Medical Association. New Orleans, April, 1880.

Thirteenth Annual Report of the Inspector of Asylums, Prisons, and Public Charities for the Province of Ontario for 1880.

Forty-Sixth Annual Report of the Waterford District Lunatic Asylum for 1880.

Report of the Investigation by the Commissioners on Charitable Institutions of the City of St. Louis, October 26, 1880.

The Law of Commitment to Hospitals for the Insane in the State of Illinois.

Kankakee, by Rev. F. H. Wines, Secretary, Illinois State Board of Charities.

Report of the Superintendent of the Nebraska Hospital for the Insane for 1878-80.

Fifteenth Report of the Board of Trustees of the Connecticut Hospital for the Insane, 1881.

Report of the Albany Hospital for two years ending January 31, 1880.

Third Biennial Report of the Board of Managers of State Lunatic Asylum Number 2, of Missouri.

Reports of the Trustees and Superintendent of the Butler Hospital for the Insane, Providence, R. I., January, 1881.

Annual Report of the Trustees and Superintendent of the State Lunatic Hospital of Pennsylvania, 1880.

Twelfth Annual Report of the Trustees of the Willard Asylum for the Insane for 1880.

Second Biennial Report of the Illinois Eastern Hospital for the Insane at Kankakee, October 1, 1880.

Seventh Annual Report of the Cincinnati Sanitarium, 1880.

THE FOLLOWING FOREIGN PERIODICALS HAVE BEEN
RECEIVED SINCE OUR LAST ISSUE.

Allgemeine Zeitschrift fuer Psychiatrie und Psychisch. Gerichtl.
Medicin.
Annales Médico-Psychologiques.
Archives de Neurologie.
Archives de Physiologie Normale et Pathologique.
Archiv fuer Anatomie und Physiologie.
Archiv fuer die Gesammte Physiologie der Menschen und Thiere.
Archiv fuer Path. Anatomie, Physiologie, und fuer Klin. Medicin.
Archiv f. Psychiatrie u. Nervenkrankheiten.
Archivio Italiano per le Malatie Nervose.
Brain.
British Medical Journal.
Bulletin Générale de Thérapeutique.
Centralblatt f. d. Med. Wissenschaften.
Centralblatt f. d. Nervenheilk., Psychiatrie, etc.
Cronica Med. Quirurg. de la Habana.
Deutsche Medicinische Wochenschrift.
Deutsches Archiv f. Geschichte der Medicin.
Dublin Journal of Medical Science.
Edinburgh Medical Journal.
Gazetta degli Ospitali.
Gazetta del Frenocomio di Reggio.
Gazetta Medica di Roma.
Gazette des Hôpitaux.
Gazette Médicale de Strasbourg.
Hospitals-Tidende.
Hygeia.
Jahrbücher für Psychiatrie.
Journal de Médecine de Bordeaux.
Journal de Médecine et de Chirurgie Pratiques.
Journal of Mental Science.
Journal of Physiology.
La France Médicale.
Le Progrès Médical.
Lo Sperimentale.
L'Union Médicale.
Mind.
Nordiskt Medicinskt Arkiv.
Norsk Magazin for Lagensvidenskabens.
Practitioner.
Revue De Médecine.
Rivista Clinica di Bologna.
Rivista Sperimentale di Freniatria e di Medicina Legale.
Schmidt's Jahrbücher der In- und Ausländischen Gesammten
Medicin.

St. Petersburg Med. Wochenschrift.
 Upsala Lakarefornings Förhållinger.

THE FOLLOWING DOMESTIC EXCHANGES HAVE BEEN
 RECEIVED.

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| Alienist and Neurologist. | Medical Brief. |
| American Journal of Insanity. | Medical Herald. |
| American Journal of Medical Sciences. | Medical News and Abstract. |
| American Journal of Obstetrics. | Medical Record. |
| American Journal of Pharmacy. | Michigan Medical News. |
| American Medical Journal. | Monthly Review. |
| American Practitioner. | Nashville Journal of Medicine. |
| Annals of Anatomy and Surgery. | Neurological Contributions. |
| Archives of Comp. Med. and Surgery. | New Orleans Medical and Surgical Journal. |
| Archives of Dermatology. | New Remedies. |
| Archives of Medicine. | New York Medical Journal. |
| Atlanta Medical and Surgical Journal. | Pacific Medical and Surgical Journal. |
| Boston Medical and Surgical Journal. | Philadelphia Medical Times. |
| Buffalo Medical Journal. | Physician and Bulletin of the Medico-Legal Society. |
| Bulletin National Board of Health. | Physician and Surgeon. |
| Canada Medical and Surgical Journal. | Proceedings of the Medical Society of the County of Kings. |
| Canada Medical Record. | Quarterly Epitome of Braithwaite's Retrospect. |
| Canadian Journal of Medical Sciences. | Quarterly Journal of Inebriety. |
| Chicago Medical Journal and Examiner. | Rocky Mountain Medical Review. |
| Chicago Medical Review. | Sanitarian. |
| Chicago Medical Times. | Science. |
| Cincinnati Lancet and Clinic. | Southern Clinic. |
| Clinical News. | Southern Practitioner. |
| College and Clinical Record. | Specialist and Intelligencer. |
| Country Practitioner. | St. Joseph Medical and Surgical Reporter. |
| Detroit Lancet. | St. Louis Clinical Record. |
| Dial. | St. Louis Courier of Medicine. |
| Gaillard's Medical Journal. | St. Louis Medical and Surgical Journal. |
| Independent Practitioner. | Therapeutic Gazette. |
| Index Medicus. | Toledo Medical and Surgical Journal. |
| Indiana Medical Reporter. | Veterinary Gazette. |
| Maryland Medical Journal. | Virginia Medical Monthly. |
| Medical and Surgical Reporter. | Walsh's Retrospect. |
| Medical Annals. | |

THE
Journal
OF
Nervous and Mental Disease.

Original Articles.

ON SOME POINTS IN REGARD TO COLOR-
BLINDNESS.

By B. JOY JEFFRIES, M.D.,

BOSTON, MASS.

IN No. I, vol. viii, of this JOURNAL is an article by Dr. Bannister, with the above heading, which I feel called upon to answer or criticize in some points.

The author says : "If color-blindness of certain kinds and degrees does not disqualify the individual from correctly distinguishing signals, as is claimed by Mr. Wm. Pole, then the practical importance of the defect is greatly diminished, if not altogether destroyed, as regards these occupations."

Even if we refuse to accept any of the testimony from the experts on the other side of the water, we have a perfect answer to this from the examinations made in this country. From the report of the Board of Health of Connecticut, it will be seen that all persons shown to be color-blind by the worsted test failed in the examination with flags and lanterns, even at the distance the railroad employés and their counsel claimed was fair. I am conversant with Mr. Pole's case, both from the published description

and personal correspondence, and am certain he would fail to distinguish colored railroad and sea signals at distances at which they must be distinguished to render traffic on land and sea safe. I would here refer to the reports of the marine hospital surgeons in the last annual report of the Sup. Surg. Genl. My own experience perfectly coincides with what Holmgren, Donders, and others have said on this point. Donders' apparatus for transmitted light gives us just the condition of colored signals, without extraneous circumstances to help the color-blind to guess by. By it I have never failed to show how dangerous a color-blind was, no matter how little defective he was. The point is just this. There are many so color-blind that they cannot tell red from green signals *close to*, others can distinguish them a little further off, and so on, up to the normal eye's power. A color-blind pilot could not tell *which* light I held up in my office when not ten feet from it. It was said he had never met with accidents. He himself honestly believed he could see the signals as we did, and would never fail. He was perfectly unaware of all the extraneous circumstances which helped him to *guess* which light was before him. In reference to these surroundings, I must, for truth's sake, refer to my manual, and to the Sup. Surg. Genl. Report above mentioned. *But all these helps may fail.* A pilot sees *one* light and has no chance to *compare* the two, which he might distinguish if they were seen together. The pilot of the tug Lumberman failed once, mistaking red for green, and it cost ten lives and much property. The cause of how many more accidents will thus be cleared up, provided the author, as in the case of the Norwalk accident in Connecticut and the Revere accident in Massachusetts, are not beyond the reach of expert testing! This last winter, Prof. Camalt, of Yale, and myself, spent several hours at Washington in proving to the Super-

vising Inspectors of steam-vessels that lanterns were no tests for color-blindness, and that any degree of chromatic defect was dangerous, in spite of the reports of the local inspectors and their examinations. A handsome vote of thanks from the Board proved that our arguments were convincing. When now it is said that those "who may be scientifically color-blind" can see colored signals as well as the normal-eyed, it simply is not true, and EXPERT testing, even with lanterns, will, as in Connecticut and elsewhere, prove it to hasty and even recalcitrant officials. Mr. Pole's remarks were quoted last summer in Connecticut, versus examinations of railroad employés. And so were Mr. Herbert Page's. But since the latter has gone to work in England, with Holmgren's method, he is quite convinced of all I would claim, and has so written me, asking me also to make any use of his letter which may assist the cause of control in this country. The physical impossibility of the color-blind *seeing* as we do, and therefore *believing* as we do, has naturally led them to make many assertions which thorough investigation would contradict, and these have done great harm. I cite Mr. Pole, Prof. Delboeuf as to supposed cure by fuchsine, and I must add Dr. Bannister, for although he prefixes his sentences above quoted with *if*, yet he must remember that all interested pecuniarily or otherwise in opposing laws of control on land or water, will omit this *if* in arguing before committees or officials.

That all this is a pretty practical issue will be admitted, when it is seen that by the rolling up of such apparent evidence the opposers of control can go so far as to say, as does the *Chicago Inter Ocean* of December 17, 1880: "All this being true, the originator of the yarn system ought to be put in jail, and pilots who have suffered ought to bring suit against the government for damages. We say this in all seriousness, and good lawyers inform us that they think damages can be recovered," etc., etc.

The writer says : " Again, if this infirmity is curable by exercise or education, as is held to be the case by Dr. Favre, who was himself one of the first to call attention to the practical points involved, then the whole subject is deserving of far less importance than is nowadays attributed to it."

Here is another *if*, which " good lawyers" will omit when arguing for the consignment to jail of the author of the " yarn system." If the JOURNAL readers will take the trouble, they can find in my manual, by Holmgren, in the *Brit. Med. and Surg. Journ.*, March 28, 1878, and in the monographs and journal articles from all over Europe, overwhelming testimony to the absurdity of the mistake of Dr. Favre in classing as color-blind all boys and girls who failed to *name* colors correctly, and as *cured*, all of those who could be *taught* to call them rightly. I confess to a little surprise, to say the least, at the author thus introducing Favre's ideas, so long ago entirely exploded. I do not think it necessary to say more on this point.

Dr. Bannister says : " If either of these views is correct, it is a reasonable presumption that a person in constant exercise of his perceptive powers in the distinction of colored signals, would be able to overcome or compensate for this particular defect, so far as all practical purposes are concerned, while still, it may be, exhibiting it in the plainest manner to the usual tests. Some facts point very strongly in this direction ; the recent examinations of pilots and engineers have revealed cases of color-blindness where it was utterly unsuspected, and in persons who had acceptably filled positions for many years that required daily, and almost hourly, exercise and test of their ability to correctly distinguish colored signals."

This is precisely what makes these men so dangerous, namely, that like the color-blind in other avocations of

every-day life, they escape detection. Now, we have means of readily exhibiting their defect, and of showing how they have caused accidents, the reason of which has hitherto been unexplainable.

It is not any *change* in the color-blinds' chromatic sense which has enabled them to get along as well as they have, but simply the various means necessity has taught them to supplement their want by. As to just what these means are, I must refer again to my manual. They are now quite well understood, and recognized by all examiners. Dalton's color-sense did not alter through life. Many a scientific color-blind, as chemists, etc., have told me how hard they have tried to learn to see colors correctly, but that they were still the same in advanced life. The color-blind cannot see, and, therefore, cannot believe this. In correspondence with the author, I have said that it would, I thought, be possible for a partially color-blind to become educated within his range, as the normal eye becomes educated. Precisely how much this would help him, is very hard to decide, as it is difficult to separate this possible cultivation of his color-sense from the other extraneous helps outside of this sense, which he uses quite unawares to himself. My experience with highly educated color-blind, who needed the chromatic sense for their special studies, and who, therefore, in course of years, would have cultivated the eye all possible, has been that they wholly failed when all the extraneous helps were removed, and they had to decide by the color-perception alone, just as the color-blind pilots reported, failed when all that enabled them to *guess*, was removed. I have never seen any one, even officials, ready to trust their lives, or others, to the color-blind after their defect was perfectly demonstrated to them. It can be readily shown that such a color-blind as Dr. Bannister would be a dangerous pilot or engineer, since he

could not see colored signals quickly enough, or far enough off. In describing his defect, Dr. Bannister says: "The lithium line is a very beautiful and typical red." * * * "I recognize all the spectral colors as distinct in tint, except, perhaps, indigo, which seems only a variety of blue." The casual reader might be misled by this. It must be remembered that the color-blind in any degree cannot, of course, see red and green as the normal-eyed. This is now perfectly proved by the reports of cases of monocular color-blindness. Their use of the same terms or expressions for colors as we do, is no proof of having the same sensations we do. This can very readily be shown by Maxwell's discs. Dr. Bannister cannot see red with the brilliancy we do.

The author says: "It may easily be, and, indeed, it appears highly probable, that a deficient early training, and a lack of special observations of colors in early life, when the cerebral centres are receiving those first impressions that most strongly influence their organization, may have, as their result in adult life, a defect of color-sensibility, varying in degree from scarcely perceptible enfeeblement to pronounced partial color-blindness, or to dyschromatopsia, as in my own case. It may even be that to this, combined with heredity, is due the relatively greater frequency of the defect in the male sex."

We were all, I think, at first inclining to adopt this reasoning, but facts do not support it. Children as young as between three and four years can be readily tested, and their color-blindness detected with certainty. In the case of girls, their education and surroundings would especially tend to develop the color-sense, yet it does not. Mothers have told me how they have worked over their color-blind boys in vain, in endeavoring to teach them to see differently. Others, of course, like Dr. Favre, have made the mistake of supposing that because the color-blind could be

taught to remember the color names of objects, that the color-sense was altered. I do not here refer to the 20 or 30 per cent. of boys whom he called color-blind, because they did not know color-names, and whom he supposed he cured of color-blindness by teaching them these color-names.

Dr. Bannister refers to the mention in my manual "of dulness of color-perception, or rather a peculiar slowness in the colors taking effect." I do not mean by this the retardation of color-perception, "which he describes in his own case, but the slowness to catch colors, which would be helped in the normal eyes by brightening them. For instance, in a poor light or on a dull day, both the girls and boys went through the test less quickly. I had even to take this into consideration in calculating my time at the schools, etc.

The author seems to have misunderstood as to the blind children whom I asked to name the colors of objects. Six were blind from birth, totally so, and only knew by *ear* the color-names of objects. The seventh I said could see somewhat, tell light from dark. This I intended to show by quoting his expression that it was "hard for him to get hold of colors," meaning that he got hold of colors through the eye with difficulty, because he could see so poorly; he was, therefore, not to be classed with the six totally blind from birth.

I must criticize the deductions Dr. Bannister has made from his supposed peculiar chromatic sense or condition, viz.: that by "mental effort" he *can* see colors sooner or later. He says: "The usual test employed in this country for the examination of railway employés and pilots—that of Holmgren—makes, however, no allowance for this variety of color-defect." Dr. Jeffries, the principal authority on this subject in this country, says, in his directions for the use of this test, referring to the colored plate accompanying it: "If

the person examined takes any of the confusion colors ($\times 5$) to put with the green, he proves himself color-blind ; or even if he seems to want to put them together. This rules out all hesitation, and condemns at once as defective any one who exhibits any uncertainty, requiring mental effort or comparison." These directions and explanations are Prof. Holmgren's, and are, of course, to be taken in connection with the very careful and minute description of the tests which he has given, and which I have translated in full in my manual. One great difficulty about the worsted test is that it can only be best learned *de situ*, and when so learned, these directions are quite plain. This same direction was quoted by the Mass. Railroad Commissioners in arguing before the Railroad Committee of the Legislature last year, versus my position of the need of expert examiners. It, of course, gave me a very good opportunity of making a strong point in my favor. The hesitation such a color-blind as Dr. Bannister would exhibit, the expert recognizes as due to color-blindness, and this is the hesitation Holmgren means, as a study of *all* he says, and some personal familiarity with the test will show. There is great difficulty in so describing the test and its application as to be properly understood. He states most distinctly that it can best be learned *de situ*. This is very expensive, as proved by the medical officers of the U. S. government who have studied the use of the test by working with me in our schools, etc.

Dr. Bannister says: "Holmgren's test has the advantage of detecting very slight abnormalities of color-vision, but it also has the defect of exaggerating them." The first part of this is true, and hence the *very great value* of the test. The second part is not the case when it is properly applied, and this is not such a simple thing as it at first seems. Recent letters from Prof. Holmgren admit and

confirm this fully. The worsted test quickly shows such defect as Dr. Bannister reports that he has, and all other tests, as with lanterns, etc., when *properly applied*, will show the danger of this amount of chromatic loss. These so-called "practical tests," which are difficult, consume time, require special apparatus, and open wide the door for collusion and cheating, will only finally, as Surgeon Hutton of the Marine Hospital Service says, "confirm what was decided, *within* five minutes after commencing the first examination," with the worsteds.

What Dr. Bannister says about the greens and blues in relation to Holmgren's test, would lead me to think that he had not seen it carried out always as it should be. An expert takes no account of the lack of appreciation, from want of training or education, between greens and blues, and also will understand when any such confusion means violet-blindness to be decided by test II with purple. Prof. Holmgren or his adherents can not be responsible for gross mistakes in testing, any more than for the mistake of using the colored plate to examine for color-blindness by, as has been done.

Dr. Bannister says very properly: "When we consider that a man's whole livelihood may depend on the result of the examination, the advisability of avoiding unnecessary mistakes is sufficiently obvious."

As in this country the community is always sacrificed to the individual, we must remember that the slightest source of danger from color-blindness ought to be eliminated, and the lives of a whole steamer or train-load of passengers not be jeopardized for the benefit of a partially color-blind pilot or engineer, who may guess right or may guess wrong.

Again, he says: "Holmgren's should be always carefully supplemented with some other that approaches more nearly

the practical conditions that the color-sense must meet, in cases of incomplete color-blindness. Donders' test with lights seen through colored media in apertures of various sizes, appears to me much more satisfactory for practical purposes than the generally employed one of Holmgren."

This test of Donders' is not to find out whether a person is color-blind,—that Donders' has by Holmgren's or his modification of it,—but to ascertain the *degree* of color-blindness. The great difficulty is that it is not a *comparison* test; we have to ask the examined what he sees, and he has to *name colors*, a source of great danger in testing. Moreover, it will be found that wherever proper laws have been made for testing thoroughly, *control tests*, so-called, are always used besides the worsteds. But time and absolute experience among large numbers of railroad employés have shown the very great value and accuracy of this test of Holmgren's, because wherever a man has been by *proper examiners* shown to be color-blind by it, all the additional or control tests have but confirmed this decision. And, moreover, wherever a man has by proper examiners been shown by Holmgren's test to be in any degree color-blind, he has equally well been shown to be dangerous, in that he could not distinguish quickly and readily, as can the normal-eyed, the necessary colored signals.

Dr. Bannister says, further: "I might discuss here at length the vision of the color-blind, and examine the claim made by Mr. Pole that the red-blind individual, seeing red light as a dark saturated yellow, could yet distinguish it from the green, especially if the blue-green, the complementary color to red, and the tint advised by M. Redard in a recent report to the French government, is used instead of the manifold tints now employed."

An engineer or pilot sees *one* light, not *two*, and has no opportunity for comparison, and no time to stop and *think*

which is before him. The flash of *color* to the normal-eyed is instantaneous, and hence the value of color for signals, and safety in having only normal-eyed in positions where so much depends on their being *felt* "like a slap in the face," as my friend, Prof. Camalt, said in arguing before the Massachusetts Railroad Legislature Committee.

As to Redard's *wholly theoretical* suggestion of the use of bluish-green as opposed to red, experience has shown that it is precisely the bluish-green glass which must be discarded, because all the blue in it breaks down the light to such an extent that, in consequence, two distinct starboard lights are sold on the ships. One of them is deep bluish-green, and it reduces the amount of light so much that the purchaser is pretty sure to return and want it changed. The dealer then replaces it with a pale yellowish-green. This the buyer brings back and says it is mistaken for an ordinary white light, when the change is made again back to the dark bluish-green. After a presentation of these facts, and an exhibition of the several signal glasses before the Board of Supervising Inspectors of Steamboats at Washington, they requested the Secretary of the Treasury to put in the hands of local inspectors *standard* red, green, and white glass, to which all lights on steamers must conform. These standard glasses are now being made, and bluish-green will be particularly avoided. All this applies equally well to the glass for railroad signals. Officials of all kinds have there made the mistake of supposing that a man reported by expert examiners color-blind by the worsted test, was not so or was not dangerous because he could distinguish these *bluish-green* glasses from the red. The red- or green-blind, of course, see blue and yellow as we do. Now a large glass company have lately, of their own accord, thrown aside all these bluish-green glasses, and manufacture at present only pure green, so convinced were they of the danger from

the want of brightness of this dark bluish-green glass. Signal glass for railroads and the ocean should be adapted to the 96 per cent. with normal color-sense, and not to the four per cent. who are more or less color-blind.

The political office-seekers in Connecticut have just repealed the laws controlling color-blindness and visual defects among railroad employés. Massachusetts has just enacted a law of control. Mr. Wm. Pole or Mr. Herbert Page had no idea that their articles could or would be used by Connecticut office-seekers versus proper laws of control urged by the railroad commissioners and passed by the Legislature, and found to be very necessary when carried out. Dr. Bannister's article would have been equally well used, though, no doubt so, opposed to the author's intention. It becomes the duty, not always pleasant, of those trying to obtain legislation, to explain the mistakes or misunderstandings which color-blind writers especially fall into.

CONTRIBUTIONS TO PSYCHIATRY.

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VI.—PSYCHOSES FROM TRAUMATISM.

TRAUMATISM is a very frequently-cited cause of the psychoses, but many of these are cases in which traumatism complicates rather than produces the psychosis. Skae¹ ranges this form and that produced by heat under the same heading, and in a preceding article I have cited his conclusions, and so need scarcely repeat them here. Voisin² claims that traumatism sometimes produces progressive paresis, which assumes the paralytic dementia type. Marcé³ says, concerning the psychoses produced by traumatism: "In the greater number of these patients the mental disease assumes an illy-defined form, offering irregular alternations of stupor, agitation, and imperfect lucidity, without systematized delirious ideas, but recovery is never complete, and the patient becomes progressively demented." Calmeil⁴ and Laségue⁵ cite cases of patients being seized by epilepsy at puberty, after having sustained injuries to the skull in childhood, and becoming victims of progressive paresis at the age of 50.

Krafft Ebing⁶ "classifies insanity from traumatism as it is: First, the direct consequence of an accident; second, manifested later, the prodromus of disordered motor and sensory

phenomena and change of character; third, preceded by a latent susceptibility (the result of the accident), which may be called an acquired predisposition, and which only requires an exciting cause to develop into actual insanity."

Crichton Brown⁷ gives the following cases of psychoses preceded by traumatism :

PSYCHOSIS.	CASES.
Amentia	1
Mania, acute	1
" puerperal	1
" general	2
" recurrent	1
" <i>a potu</i>	3
Dementia	9
" with epilepsy	5
" senile	3
" with general paralysis	3
Melancholia, hypochondriacal	3

This table scarcely needs a comment, and it speaks very strongly as to the knowledge of clinical psychiatry, of any one, that they are capable of charging cranial injuries with producing *senile* dementia, *puerperal* mania, and mania *a potu*. Bucknill and Tuke⁸ cite a case where a "fall on the back of the head" led to irritability, violence, and, finally, general paresis, and one case where a patient became emotional, irritable, and depressed, after a fall, and finally presented all the physical symptoms of progressive paresis, his memory remaining good. Schläger,⁹ in a very valuable article on this subject, gives the following statistics and opinions: Of five hundred cases of insanity, he found forty-nine resulting from injuries to the skull. In twenty-one of these the injury was followed by immediate loss of consciousness, in sixteen by simple mental confusion and wandering of the thoughts, in sixteen by dull pain in the head. In nineteen cases the disease, insanity, com-

menced within one year after the accident; the other cases after an interval of from four to ten years after the accident. Generally the patients manifested from the time of the injury a tendency to cerebral congestion, after the ingestion of even a small amount of spirits, or, mental excitement. In several cases ocular hyperæsthesia and even amblyopia made its appearance. In fifteen cases there appeared, shortly before and during the existence of the cerebral disorder, scotomic dots, which exerted a deciding influence on the character of the delirium. The patient often experienced ringing and noises in the ears. In eighteen cases there was dulness of hearing; in three, abnormal subjective perceptions of smell, and changes in the pupils. Frequently the character and disposition changed. In twenty cases great irascibility and an angry, passionate manner, even to the most violent outbursts of temper, was remarked. Sometimes, but far less frequently, there occurred over-estimation of self, prodigality, restlessness, and disquietude. In fourteen cases there were attempts at suicide, and frequent loss of memory and confusion. The prognosis in all was unfavorable; seven became progressively paretic.

Esquirol¹⁰ and Rush¹¹ both cite cases of mania produced by an injury. Azam's¹² article on the subject scarcely deserves notice. From the majority of these authorities, therefore, it would appear as if traumatism produced not only the form of insanity ascribed to it by Skae, but also other forms widely different from this.

My own cases, forty-five in number out of a gross total of twenty-two hundred cases of insanity, a smaller percentage than that of Schläger, range themselves as follows:

	NUMBER.
1. Epileptic dementia,	10
2. Epileptic mania ending in paresis,	12
3. Mania chronic with depressing delusions,	8

4. Mania chronic with depressing delusions ending in progressive paresis,	10
5. Acute mania, ultimate history not known,	2
6. Acute mania ending in paresis,	2
7. Melancholia attonita,	1

The epileptic dementers from traumatism did not vary any from the ordinary epileptic dement, and therefore scarcely need extended notice. As a rule, this class of patients had sustained the injury between the ages of ten and twenty-five. Those of the second class had usually sustained the injury between the ages of twenty and thirty-five, and of these varieties the following cases are a fair example.

CASE 1.—E. A., English, moderate drinker, common school education, was admitted to the asylum during the year 1873. Two years and a half previous had been struck on the head by a cake of ice, causing loss of consciousness for a time. A week after he had convulsions which recurred every twenty-four hours for one month and then ceased for three months, then returned at intervals of from one, two, to three months. The patient was at times violent and excitable, but on admission denies all knowledge of the periods of excitability that led to his arrest. He had a very vague aura preceding his convulsions and was slightly hesitant in speech. He continued in much the same condition for three months, being considered a case of epileptic mania passing into dementia. Eight months after this he had hallucinations which soon disappeared, he becoming alternately stupid and excited, and finally completely demented, remaining in this condition for eight months. He then began to exhibit delusions about making money by millions in the ice business, pilfered from his neighbors, and exhibited considerable motor and emotional disturbance. He soon exhibited all the usual mental and physical symptoms of progressive paresis, and died exhausted in the course of a year from several convulsions.

In this connection I may observe that the psychoses due to traumatism seem to be divisible into two great classes, those due to slight traumatism and those originating in traumatic injuries of a grave character. To the former class belong the cases of mania chronic with depressing delusions, while to the latter belong the other types of insanity.

CASE 2.—D. P., Irish, admitted to the New York City Asylum during 1873, was then in a condition of chronic mania with depressing delusions, and his friends gave the following history: In the spring of 1871 was struck on back of the head with a slung-shot during a street fight, after which the patient who had hitherto been good-humored became irascible, and at length had fully developed delusions of persecution which were well marked and systematized. He had hallucinations of hearing and marked insanity of manner. His delusions were built up on sundry slight circumstances and relatively logical. The patient had, on admission, a hard, dry, constrained manner, talked very suspiciously, recognized clearly that he had been committed to an asylum for the insane, but took this fact with relative calmness. He was induced, after some persuasion, to engage in some labor in the ward. The hallucinations were very vivid; the patient, however, regarded them as schemes of his enemies, and they caused him less annoyance than is usual with hallucinations. He was very careful of his dress and rather dignified in manner. He treated the physicians with relative politeness with the exception of the superintendent, who at one time acted dictatorially to him, and whom he in consequence regarded as one of his enemies. He died five years after admission, retaining to the last all his delusions.

CASE 3.—This patient was admitted in 1872; was then a clear case of chronic mania, with depressing delusions. The patient, previous to receiving a pistol-shot wound, of slight character, of the skull, was a cheerful, good-humored companion, but after recovery from this wound, became irritable, suspicious, and querulent. The patient remained about six months in the asylum, and was then taken out by his friends, but, becoming unmanageable, was returned early in 1873, having then well-marked delusions about his brother attempting to poison him, together with hallucinations about being denounced as an enemy of mankind. He was again taken out by his relatives, but returned in 1875, and was then a well-marked case of general paresis, of which he died in 1877.

These three cases are typical ones of certain phases of insanity, as produced by traumatism, coming under observation. As already remarked, slight traumatism seemed to produce different effects from grave traumatism, and these and other points connected with the question can best be shown in tabular form:

TABLE I.

	SLIGHT TRAUMATISM.	GRAVE TRAUMATISM.	TOTAL.
Epileptic dementia,	2	8	10
Epileptic mania, ending in progressive paresis,	4	8	12
Acute mania; ultimate history unknown,	2		2
Acute mania, ending in progressive paresis,	2		2
Melancholia attonita,	1		1
Chronic mania, with depressing delusions,	6	2	8
Chronic mania, ending in progressive paresis,	8	2	10
	<hr/> 25	<hr/> 20	<hr/> 45

From this table it would appear as if the majority of cases had resulted from slight traumatism.

TABLE II.

	HEREDITARY TAINT.		NO HEREDITARY TAINT.		TOTAL.
	Slight Traumatism.	Grave Traumatism.	Slight Traumatism.	Grave Traumatism.	
Epileptic dementia,	1	6	1	2	10
Epileptic mania, ending in progressive paresis,	3	6	1	2	12
Acute mania; ultimate history unknown,	2				2
Acute mania; ending in progressive paresis,	1		1		2
Melancholia attonita,	1				1
Chronic mania of depressing type,	2	2	4		8
Chronic mania, ending in progressive paresis,	2	2	6		10
	<hr/> 12	<hr/> 16	<hr/> 13	<hr/> 4	<hr/> 45

TABLE III.

Ages—	20-25,		25-40,		40-50.		TOTAL.
	SLIGHT.	GRAVE.	SLIGHT.	GRAVE.	SLIGHT.	GRAVE.	
Epileptic dementia,	2	7		1			10
Epileptic mania, ending in progressive paresis,	2	1	2	6		1	12
Acute mania; ultimate his- tory unknown,			1		1		2
Acute mania, ending in progressive paresis,			1		1		2
Melancholia attonita,	1						1
Mania chronic, with de- pressing delusions,	2	1	4			1	8
Mania chronic, ending in paresis,	2	1	3	1	2	1	10
Total,	9	10	11	8	4	3	45

From these cases it would seem to me that the following conclusions follow:

First, that traumatism produces certain psychoses.

Second, that the majority of these are unaccompanied by epilepsy.

Third, that the majority have a tendency to end in progressive paresis.

Fourth, that a large proportion are accompanied by depressing delusions.

Fifth, that the majority of these latter do not exhibit any hereditary taint.

Sixth, that, with certain modifications, Krafft-Ebing's conclusions respecting the traumatic psychoses are correct.

Seventh, that injuries received before the age of forty are probably of more effect in producing insanity than those received subsequently.

Eighth, that slight injuries, from the insidious nature of the changes they set up, are as much to be dreaded, if not more, than the grave injuries.

Ninth, that traumatic causes did not have as much influ-

ence in the production of insanity as intimated by Schläger, he finding that over eight per cent. of the cases were caused by traumatism, while at the New York City Asylum for the Insane but two per cent. were so caused.

Tenth, that certain cases of insanity caused by traumatism have well-marked systematized delusions.

Eleventh, that in all cases of insanity caused by traumatism a guarded prognosis should be given.

VII. PSYCHOSES PRODUCED BY QUININE.

That quinine should exceptionally produce psychoses, will scarcely appear surprising when its tendency to produce cerebral hyperæmia is recollected. I am unacquainted with any literature on the subject, and, therefore, report only the cases which have come under my observation.

CASE 1.—T. P., American, single; grandfather, uncle, and brother died insane. Patient had, however, been in very good health up to about three months before admission, which occurred during the year 1874, when he was attacked by headache, for which, on the supposition of its being malarial, three grains of quinine were prescribed three times a day; after taking three doses of this the patient was seized by a violent attack of acute mania, with marked hallucinations of hearing of a depressing type, and considerable dimness of vision. These phenomena persisted for three months as the quinine was continued, and the patient treated with morphia subcutaneously. On admission to the asylum, which was at length rendered necessary, the patient was in the condition already described, and was placed under chloral and hyoscyamus as a hypnotic, and conium to quiet motor excitement. Under this treatment the patient was in fit condition to be discharged within six weeks after admission. He manifested, a day previous to discharge, some slight evidences of malaria, whereupon quinine was administered, which had the effect of bringing on a fresh attack of acute mania, with the same symptoms as previously. The quinine was stopped, and the same treatment as before resorted to, when the symptoms of acute mania disappeared. The patient was discharged, fully recovered, four months after admission, but returned within a year in the same mental condition,

under precisely the same circumstances, to recover and to have a relapse under much the same circumstances as on the first occasion.

CASE 2.—P. J., Irish, æt. 30, married, brother insane, sister epileptic, uncle afflicted with shaking palsy, was admitted to the New York City Asylum in a condition of extreme dementia, being able to utter but few words, and being very neglectful about himself and his surroundings. He had been in relatively good health up to about three weeks prior to admission, when he was attacked by a slight chill, for which he was given ten grains of quinine; in three hours after he sank into the condition in which he was on admission, but from which he recovered after three months' treatment in the asylum. In 1875 he was admitted in precisely the same mental condition from the same cause; was treated much the same, and had apparently fully recovered, when, manifesting some evidences of malarial infection, an assistant physician, who was ignorant of his history, ordered him five grains of quinine, which had the effect of producing a relapse, the patient returning to much the same mental condition as he was on admission. He, however, at length fully recovered.

These cases are the only ones I have seen in an asylum experience covering over two thousand cases, and although exceedingly few in number, are, I think, of sufficient value to serve as the basis of the following conclusions:

First, that in hereditarily predisposed individuals, quinine may give rise to psychoses.

Second, that these psychoses may present themselves in two groups: one of which is a form of acute mania, with aural hallucinations, probably not entirely independent of the physiological effects of the quinine; and the other, that of extreme dementia.

Third, that quinine can exert this ætiological influence but rarely.

Fourth, that a favorable prognosis, like the prognosis in regard to the individual attacks of all acute cases of insanity occurring in hereditarily predisposed individuals, can be given.

VIII.—PSYCHOSES PRODUCED BY LEAD.

While lead appears to be a not infrequent cause of general neuroses, opinions vary widely as to the extent of its etiological power in the production of insanity. Exact figures are wanting, however, though details of well-reported cases are by no means uncommon. Among the earliest to describe cases of this kind was Tanquerel des Planches,¹³ whose description is one fully covering many points of value even now. He found that lead produced both an acute and a chronic form of insanity, the acute form being a species of melancholic frenzy with great incoherence. Lange,¹⁴ Closs,¹⁵ and Boettger¹⁶ describe cases of a similar type. Moreau¹⁷ (de Tours), Bottentuit,¹⁸ and Guislain¹⁹ narrate cases of melancholia attonita due to this cause. Leisdesdorf,²⁰ Popp,²¹ Brochin,²² and Hirt²³ report cases of what they call mania transitoria due to this cause, the mania having a decidedly melancholic type. Bartens,²⁴ in a recent interesting article, deals with this subject very fully, and finds that the psychoses produced by lead are both of a chronic and acute variety; that the acute form is a species of mania transitoria of short duration, depressing type, great incoherence, and very vivid hallucinations of sight and hearing. Lead poisoning has, according to Falke,²⁵ produced very similar phenomena in cattle. In some cases melancholia attonita is present. The chronic type presents hallucinations of taste, touch, sight, and hearing; the patients are suspicious, and have delusions of persecution. Some present the physical phenomena of progressive paresis. The prognosis in the acute type, according to Bartens, is by no means unfavorable; two-thirds of his cases recovered. Paralytic and choreic complications are not rare, and the maniacal furor is at times not unlikely to lead to death from exhaustion. The prognosis of the chronic type, as

regards recovery, is, of course, unfavorable. The great tendency of these latter cases to the development of apoplectic attacks renders the prognosis, as regards life, a very grave one.

Maccabe²⁶ reports a case of what he calls monomania with depressing delusions and hallucinations, clearly traceable to the use of lead. I have, in all, seen thirty cases of insanity due to lead poisoning, about one and a half per cent. of all cases of insanity coming under observation. There were in the great majority of these cases a strong hereditary taint. The cases presented themselves in three great groups, one, in which there was a marked melancholic furor of relatively short duration, subsiding under anti-saturnine treatment, or on the appearance of wrist-drop or lead colic. Of this type, the following three cases may serve as examples:

CASE 1.—J. P., æt. 30, Canadian, painter. Mother died during an epileptic attack, as also did the maternal grandfather. The patient, who is very regular in habits, was in good health up to about a week before admission, when, after working at his trade for about a month, he was noticed to become delirious, after having complained for some days previously of his head. On admission the patient had very vivid hallucinations of sight and hearing; complained that the Fenians, clad in deep green, were in search of him to shoot him, and that he both saw the men and heard their guns go off. He was much emaciated, and had not slept during the week prior to his admission. On examination, a deep blue line was found on his gums. He was placed, in consequence, on iodide of potassium, chloral, and conium. He slept very well during the first quarter of the night, but was noisy and boisterous during the remainder. It was ascertained on the morning of the following day, that the patient complained of his food being poisoned. He was given sulphuric acid lemonade, as he complained of great thirst. This treatment was continued for three days, when the patient grew somewhat quieter, his hallucinations becoming less vivid, and his agitation, which had been very great, markedly diminishing. Two weeks after admission, the patient was discharged, fully recovered.

This case presents many analogies to the acute form described by Bartens. Against the term transitory mania, as used by him, Falcke, and others, there are strong and valid objections. The type of insanity is not a mania but a melancholia with frenzy; the disease lasts longer than any case of transitory mania, and in no respect presents the psychical features of that disease. The treatment adopted in this case was purely symptomatic, the saturnism being dealt with as a complication and treated specially. The second case is as follows:

T. P. Irish, æt. 29, was brought to the asylum in a condition of melancholia with frenzy, rushing excitedly around the room with his eyes covered by his hands and shouting "mercy! mercy!" The patient was much run down physically, but at the first examination no details concerning his history could be gleaned from him. He was sent to a room and ordered cannabis Indica, conium, and laudanum, which seemed to have but little effect. He would not eat any thing next day, and while feeding him by force a blue line was noticed on his gums. Acting on this therapeutic hint iodide of potassium in large doses was given him during the following day; he slept quietly during the early part of that night, but grew very noisy toward morning, the previous treatment being continued. This treatment was kept up for about a week, when, the patient having fully regained his strength and resting well, the sedative mixture was stopped, the iodide being kept up, and an occasional enemad given. The patient was discharged, one month after admission, fully recovered, and gave, on leaving the asylum, the following history: His family history was very unfavorable. The father died of apoplexy, a paternal uncle was an epileptic, and two sisters are insane. The patient himself, who is a painter by trade, was in relatively good health until about three weeks before admission, when he was taken by frequent attacks of vertigo, at one time amounting to almost complete unconsciousness. During one of these attacks he stepped down from the ladder on which he was standing while painting, and recollected no more until he found himself in the asylum. He had remained in good health for about two years after his discharge from the asylum, at which time he passed from under observation.

The third case differs in some respects from the other two.

J. R., æt. 31, American; father an inmate of the asylum, mother had died an inmate of the female asylum. The patient has been in very good health up to six weeks before admission, at which time he began to feel "dizzy," staggered at times without apparent cause, and complained of a blur before his eyes. The patient made bird-cages, and lived in a close-confined room in the rear of his shop which, itself, is not well ventilated. He had been working hard for some time previous to admission, scarcely stopping for his meals. On admission the patient was markedly agitated, complained of being played upon from a hose filled with hot water, closed his eyes and stopped his ears, declaring what he saw and heard were too frightful for utterance. He was treated for three weeks with sedatives, in which opium predominated, without apparent effect. One day he was found in a condition of slight confusion, his hallucinations and agitation having disappeared, but both wrists presented the characteristic phenomena of lead-poisoning. His gums showed the pathognomonic blue lines. The patient on being placed under iodide of potassium and the usual anti-saturnine treatment made a rapid recovery.

This case is not without a parallel among those recorded by Bartens and others, for he cites, as a common phenomenon, the disappearance or amelioration of the psychic symptoms on the full evolution of "drop-wrist" and other physical symptoms of lead poisoning. The suspicion of lead poisoning would readily arise in the first two cases on account of the patient's occupation, but not so readily in the third. The second group in which lead exerted an etiological influence is well exemplified by the following cases.

CASE 1.—R. McG., æt. 29, painter; strong hereditary taint, intemperate; was admitted to the asylum once before about a year previous; then in a condition of melancholia attonita, coming on after an attack of lead colic, and recovering under anti-saturnine treatment. He has had another attack of lead colic, subsequent to which the following psychical phenomena, now present, were observed. He has a markedly suspicious manner, unsystematized delusions of persecution, very vivid hallucinations of sight, taste,

touch, and hearing. These phenomena after three months of anti-saturnine treatment disappeared, and he engaged again in his trade ; was attacked once more by same symptoms, became and remained an inmate of the asylum for two years, being then taken out by his friends in much the same condition as he was upon his third admission. He died six months after discharge, from apoplexy, having sunk into slight dementia for three months previous to this.

CASE 2.—Jno. R., painter, æt. 30, unmarried, intemperate. Father died of apoplexy, two brothers and a paternal cousin are insane. The patient was in very good health up to about three weeks before admission, when he began to complain of being followed about, when returning home from work, by men having evil designs on him. He was restless and uneasy at night, and frequently searched his rooms to ascertain if any person were hidden in them. This patient on admission had a hard suspicious manner, refused to enter into a lengthy conversation, and had evidently hallucination of hearing. On examination a blue line was discovered on his gum, whereupon he was placed under treatment for lead poisoning. He recovered after two months' treatment, and was discharged. Six months after he was again admitted, was much in the same mental condition as on his first admission, except that he now displayed unsystematized delusions of persecution. He had had an attack of wrist-drop some weeks previous to the present admission, but, disregarding these ominous symptoms, continued to work at his trade, but began at length to display such active symptoms of insanity, that his friends regarded asylum treatment as necessary. He was again placed under anti-saturnine treatment, but although the vividness of his hallucinations grew less, he still retained his insanity of manner, and was somewhat feeble in memory. Three months after admission, epileptoid attacks developed themselves, and in one of these the patient died.

There was, it is obvious, in these two cases, a progressive mental enfeeblement from the time of the second attack. The cases belonged to a large group, which hovers between monomania and dementia, with unsystematized delusions of persecution. The third group is well exemplified in the following cases :

CASE 1.—J. G., German, æt 41, painter ; was admitted to the asylum with the history of having suffered at various times from attacks of insanity on several occasions, all of which preceded by one week an attack of lead colic, and were evidently referable to the same cause. Four months before his admission he was attacked by lead colic, which was preceded as before by insanity. This, however, did not subside as before on recovery from the lead colic, but continued, and the patient was transferred to the asylum. On admission he presented the following symptoms : His pupils were markedly unequal, both responding feebly to light. The facial folds were also unequal, and his tongue was tremulous. His speech was hesitant ; he was markedly emotional, and he had delusions, both equally unsystematized, of grandeur and persecution. These symptoms improved for a time under ergot and iodide of potassium, but the patient's mental condition was that of intellectual enfeeblement. He had from time to time rather stupid delusions about poisoning. After about two years' treatment, the patient died from a paretic convulsion.

The next case has been elsewhere quoted²⁷ in illustration, however, of something other than its etiology.

CASE 2.—J. H., Scotch, æt. 36. Three months before admission, early in 1876, had lead-colic, succeeded by an attack of drop-wrist, which in turn was followed by hemiplegia and aphasia. The patient recovered from this under anti-saturnine treatment, but slight spots of his skin began to change color, followed by similar changes in his hair. On admission the patient presented the usual mental and physical symptoms of progressive paresis. Four months after admission he complained of band-like sensations about the fifth lumbar vertebræ, with electric-like pains down his thighs. He was at length confined to bed, dying within three months from a paretic convulsion.

Before contrasting these results with those obtained by Bartens and others, it would be well to enquire what peculiar forms of insanity lead has given rise to. Of these thirty cases eight were cases of melancholia, of greater or lesser duration ; three, cases of acute mania, of short duration ; five were cases of the second group ; nine were cases of ter-

minal dementia ; and five were cases of progressive paresis. In contrast with these results it may be said that the cases reported by Bartens have been principally mania transitoria, at he puts it, properly melancholia with frenzy, and a form of what he calls insanity with apathy, really melancholia attonita. The chronic types given by him were principally dementia. While it cannot be said that these cases denote that lead produces peculiar psychoses, it certainly gives a depressing tinge to any psychoses it produces. Like Bartens I have found that the acute psychoses produced by lead have a favorable prognosis ; all of my cases recovered, but the chronic forms all died insane, or still continued to be insane long after my leaving the asylum. From these cases I feel warranted in concluding :

First, that lead poisoning produces certain psychical manifestations.

Second, that these manifestations may be of an acute or chronic type.

Third, that in any case the psychosis always preserves an element of depression.

Fourth, that the acute forms usually resemble melancholia with frenzy.

Fifth, that the chronic forms vary from a condition resembling monomania, but with a strong element of dementia, to progressive paresis.

Sixth, that the prognosis in the acute types is favorable.

Seventh, that anti-saturnine remedies are of great value in treatment.

Eighth, that the prognosis of the chronic types is, as might be expected, bad.

Ninth, that heredity, as in all other psychoses, is an important element in the production of these.

IX.—STEALING AS A PREMONITORY SYMPTOM OF PROGRESSIVE PARESIS.

Lélut,²⁸ Baillarger,²⁹ Parot,³⁰ Billod,³¹ Brierre de Boismont,³² A. Sauze,³³ Maudsley,³⁴ Burman,³⁵ Fabre,³⁶ Darde,³⁷ Mickle,³⁸ Voisin,³⁹ and others, have reported various cases in which paretics have committed thefts and other violations of morality. My experience in this matter has been, by no means, an unusual one. I have observed many cases in which phenomena of this kind were the first obvious evidence of the patient's insanity, but which was not recognized until the patient had been tried and condemned to the penitentiary. The following case fully illustrates this:

CASE I.—R. C., Irish, stone-mason, had been an honest, hard-working man up to a month prior to admission, when he deliberately entered a variety store, and in plain view of every one took four shirts. Despite the peculiar stupid character of the act the man was tried and, as the store had been much victimized by shoplifting before his attempt, received a sentence of six months in the penitentiary. About a week after his arrival there he was noticed to be very uncleanly in habits, and was several times punished without effect, when it was suggested that the patient might be insane. On an examination of his mental condition being made he was found to have very expansive delusions. The patient was in consequence transferred to the asylum, and on admission presented the usual symptoms, mental and physical, of progressive paresis, from which disease he died a year and a half later.

Certainly it was a great injustice that condemned this man to the penitentiary and to the punishment inflicted on him there. It strongly hints at the propriety of submitting every case of theft, where the exact motive is inexplicable, to medical examination. The psychological basis of these thefts is easily explained. The patient claiming to be wealthy regards himself as taking things on credit to be subsequently paid for.

This propensity for stealing of the paretics led me to watch for a year a case of monomania in whom it appeared suddenly, and who, a year after, developed marked symptoms of paresis. These cases, clear as they may be at times, should lead to a little caution in the condemnation of all criminals whose crimes are a little inexplicable on the grounds of stupidity.

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SPASM OF THE CILIARY MUSCLES OF CENTRAL ORIGIN.*

BY DR. H. GRADLE.

THE case upon which this paper is based presents the rare occurrence of a contracture of the ciliary muscles apparently in consequence of brain disease. Ciliary spasm is a common complaint in ophthalmic practice, but in the instances ordinarily observed the spasm arises from some condition in the eye. The exaggeration of a true myopia and the simulation of shortsightedness in a really hypermetropic or astigmatic eye by reason of such spasm, are everyday occurrences. But in these instances we cannot usually speak of a contracture of the ciliary muscle, for the spasm persists only while the eye is adjusted for some visual object. When the patient is examined ophthalmoscopically in a dark room, it is easy to measure the true refraction. The ciliary muscle relaxes nearly completely under these circumstances, and the refraction thus determined is found nearly the same as after paralysis of accommodation by means of atropia. I add the word nearly, because a slight normal tonus of the non-atropinized muscle is undeniable. Instances of ciliary spasm so persistent as to stimulate myopia even on ophthalmoscopic examination are much less common. In fact, such an occurrence as a complication in the ordinary anomalies of refraction is wholly denied by some

* Read before the American Neurological Society.

authors of experience. I have likewise never seen an instance of it. A true and persistent spasm of the ciliary muscle from other causes has only been reported a few times. It was generally due to some trauma, abrasion of the cornea, or contusion of the eyeball. A few cases are reported as accompanying facial neuralgia and blepharospasm. Most instances of which I could find mention in ophthalmic literature were confined to one eye. But as far as I have been able to learn no instance of apparent myopia suddenly beginning in consequence of a brain lesion has yet been reported. The patient in whom I observed this unique state of affairs is a lady 23 years of age, who was referred to me, through the kindness of Dr. Jewell, for the ophthalmic features of the case.

The patient, previously in good health, had a very protracted labor during five days in March, 1880. Two days before the birth of a healthy child she was attacked with left hemiplegia while sitting in her chair. She had had no premonitory symptoms; she did not lose consciousness and did not complain of headache, but was simply faint and confused in her mind. Her speech was heavy for some days. The paralysis extended to the entire left side, but the face soon recovered from it, while the limbs improved in power more slowly. At no time was there any involvement of sensory nerves. The only interference with any of the involuntary functions consisted in transitory paralysis of the bladder, necessitating the temporary use of the catheter. In the following October, when she was examined by Dr. Jewell and later by myself, there remained only a paresis of the left arm, with complete paralysis of the extensor muscles. The hand was flexed but no contracture existed. According to Dr. Jewell's notes the patellar tendon-reflex was considerably exaggerated on the left side and rather energetic in the right knee. The patient was,

moreover, neurasthenic. The treatment consisted in the use of the induced current with massage of the paretic limb. Strychnia was given and attention paid to the neurasthenic complaints. There has been, however, but little improvement in the control of the muscles involved. The extensors are still wholly paralyzed.

This history points clearly to hemorrhage in the region of the right internal capsule. The actual destruction of nerve tissue was probably quite limited, and the involvement of the entire half of the body due to compression of the surrounding strands, or inhibition. But this anatomical diagnosis fails to explain the peculiar ophthalmic symptoms observed.

The patient claims to have always enjoyed perfect vision. In the fall previous to the accident she suffered of occipital headache for a few weeks, during which time her pupils were unusually wide, but there was no disturbance of sight. After the occurrence of the apoplexy she noticed a decided blurring of sight, especially on looking at a distant clock. She cannot now state exactly how soon her attention was directed to it after the apoplexy. This haziness of sight had not changed when I first saw her in October. At first she could not read at all, later on only with difficulty. At the examination I found her sight about one-tenth of the normal acuity. She accepted a concave glass of 1.75 dioptrics for the right eye, and 2.25 for the left eye. On account of the late hour and the approaching darkness, the examination was not quite satisfactory. She read the finest print, but only at a distance of 5" to 7", and with the above concave glasses at 8" to 12". Objectively the eyes presented no evidence of disease. The pupils were of normal size and mobility. The ophthalmoscope showed a normal fundus, a deep central excavation of the papillæ, which were well reddened, but not abnormally so. In the left eye the edges

of the disc were not sharp, while in the right eye there existed a small conus. Ophthalmoscopically, the myopia was measured to be 1.5 dioptrics in each eye.

The history caused me to suspect the spasmodic origin of the myopia, but the patient, when assured that there was no immediate danger, was anxious to return home to a distant city. Hence, a further examination was postponed until the middle of November.

On her return, at this date, the following notes were taken :

R. E. $V = \frac{20}{80}$ with -1.5 D— $V = \frac{20}{25}$.

L. E. $V = \frac{20}{80}$ with -1.5 D— $V = \frac{20}{30}$.

Her near-point is 5" from the eye, but Sn 1.25 is not read any further off than 12". There exists no anomaly of the ocular muscles. Tested with prisms, they are found to be of full strength. Examination of the visual field and color-perception showed no anomaly. Ophthalmoscopically, no change was noted; it still required a correcting-glass of 1.5 D concave to see the disc and central part of the retina clearly.

That the myopia was not an anomaly of refraction, but one of accommodation, was distinctly suggested by the inability to read at a proper distance. A myope, requiring a glass of 24" focus and possessing a nearly normal visual acuity, can read not too fine a type at a distance of 24 inches. This patient, however, evidently exerted her accommodation unduly when converging for an object at that distance. It was one of those rare cases in which the accommodative apparatus did not act in harmony with the internal recti muscles. Every thing beyond 12" distance was seen indistinctly, although with parallel visual axes the apparent myopia was corrected by a glass of 24" focus. I could trace the inability to read beyond 12" distance to such an accommodative effort, greater than proportionate to the converg-

ence, in two ways. With concave glasses, correcting the myopia, apparent when the visual axes were parallel, she could not read at a much greater distance than without them, while I could increase her reading distance up to 16" by means of weak prisms, with the bases turned inward so as to diminish the contraction of the internal recti muscles. Such abducting prisms, however, did not diminish her myopia for the distance.

The nature of the shortsightedness was at once revealed by a thorough application of atropia. She returned to the office delighted with her normal sight. On testing I found $V = \frac{2}{3}0$ without glasses, while the addition of a convex glass of 0.5 D, in front of the right eye, gave her about the full sight possible to a strongly atropinized normal eye. The left eye was perfectly emmetropic.

The entire trouble, hence, consisted in a symmetrical, tonic, uninterrupted contraction of the ciliary muscle, increasing the refraction of the eye by 1.5 dioptics. On converging for near objects this spasm evidently increased, until at a distance of 12" the accommodative and converging efforts became about proportionate. The strength of the ciliary muscle had not suffered, since the patient's near-point (5") corresponded to the usual figure of emmetropic eye at that age. This permanent contracture had not given rise to any unpleasant sensations. Since no other cause could be accused, and the spasm occurred suddenly within a very short time after the apoplectic attack, it is fair to consider it a consequence of the latter. In what manner, however, a lesion in or near the internal capsule can keep up a tonic but feeble activity of the ciliary branches of the motor oculi, cannot be decided. It is certainly noteworthy that notwithstanding the close anatomical relationship of the nerves of the iris and of the ciliary body there existed no pupillary anomaly.

As soon as the effect of atropia ceased, the former trouble returned. I advised her by letter to continue the application in a more dilute form. By trial she learned that a solution of one part of atropia in 3,500 parts of water removed the spasm completely, without enfeebling the accommodation sufficiently to interfere with reading. With this application she saw well, both in the distance and near by, while the inconvenience occasioned by the dilated pupils could be avoided by the use of smoked glasses. One drop of this solution every three days sufficed to keep her eyes in a satisfactory condition. She returned in March, at which date I found the former trouble unchanged, since she had not used the atropia for some weeks. At that time she called my attention to a peculiarity she had lately discovered. Her vision increased at once in distinctness on turning the head sideways, while retaining the eyes in their original direction. By trial with glasses I could not well decide, whether the myopia really diminished on exerting thus the external rectus of one, and the internal rectus of the other eye. At any rate, her visual acuity rose by this manoeuvre from $\frac{20}{80}$ to $\frac{20}{60}$ as tested with Snellen's plates. Since she was anxious to return home, I was limited in the choice of my remedies. Explaining to the husband the questionable efficacy, I have still had him make a number of metallo-therapeutic attempts, by applying various metallic discs to the temples as well as magnets to the nape of the neck. The intelligent patient tested herself carefully during these experiments with type at different distances and found no influence whatever. She has now returned to the use of the dilute atropia solution. The only remedial procedure of which I could find a promising record in ophthalmic literature is the hypodermic injection of strychnia, with which Nagel has succeeded admirably in a case of one-sided ciliary spasm.

TUMOR OF THE PONS VAROLII, WITH CONJUGATE DEVIATION OF THE EYES AND ROTATION OF THE HEAD.*

By CHARLES K. MILLS, M.D.,

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R. C., æt. 32, single, groom, had for several years been intemperate, and had a history of syphilis. About five years before coming under observation he had twice been thrown from a horse and kicked on the head. After the occurrence of these accidents he began frequently to suffer from severe headache which always came on at night. He also had at times spells of dizziness. Four weeks before coming for treatment he fell on the ice, striking his head. At the time he noticed no ill effects from the fall, but a week later, while grooming a horse, he became dizzy and fell to the ground, but did not lose consciousness. A few days later his eyes began to trouble him, and he also noticed a slight loss of power in his right arm and leg. Such was the history obtained from the patient, whose memory was defective, but I think it probable that his ocular and paretic symptoms were of longer standing than a few weeks.

On admission to the Philadelphia Hospital he was able to walk about the wards and even go out of doors, but he was weak, anæmic, and apathetic. The right side of the forehead wrinkled more promptly than the left. The lower part of the right side of the face, and the right arm and leg were paretic, but decided paralysis and contractures were not present. Sensation was diminished in the left side of the face and in the right limbs, but owing to the patient's mental condition, his answers with reference to sensation were somewhat confusing and conflicting. Hearing, smell, and taste were preserved.

Both eyes were kept constantly directed to the right. The pa-

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tient could not by the utmost effort bring them even to the median line. They had a fixed, staring expression. The pupils, however, were not dilated; they were at this time equal and about normal in size. Dr. E O Shakespeare, ophthalmologist to the Philadelphia Hospital, examined the eyes for me, and the following notes were made by him: "The corneæ and other media were transparent. There was a conjugate deviation of the optic axes to the right. The power of accommodation was not greatly impaired, and in the act of accommodation there was an associated convergence of the optic axes and the usual contraction of the pupils. In attempted movements of the eyes to the left, the right eye turned slightly, the left eye scarcely at all. The right lid showed a slight tendency to ptosis. This was most noticeable in attempts to raise the eyes above the horizontal meridian. Ophthalmoscopic examination of the left eye gave the following results: Fundus seen with a $+ \frac{1}{2}$ glass. It was of a pale reddish-yellow color. The outline of the disc was distinct, but not as marked, or as regular, as normal. It was more or less opaque and slightly hyperæmic. The arteries were scarcely distinguishable from the veins by their color. The former were a little contracted, but were regular in their course. The view of the whole fundus was, however, slightly veiled. In consequence of the extreme deviation of the eyes to the right, the right eye could not be satisfactorily examined by the ophthalmoscope."

On cutting the patient's hair close to the head, a scar about one inch and a half in length was found in the scalp of the left side of the head. Its direction was from behind forward, and from above downward, at a slight angle, its posterior end being three and a quarter inches in almost a direct line above the external auditory meatus. It corresponded to the middle region of the squamous portion of the temporal bone. The bone beneath the scar appeared to have in it a cleft. Two slight scars were found in the scalp of the parietal region of the right side.

The patient was placed upon potassium iodide, tonics, and nourishment. He got weaker from day to day, however, his ocular and paretic symptoms remaining about the same. He was compelled because of weakness and dizziness to stay in bed. His nose began to bleed, the blood sometimes escaping from one nostril and sometimes from the other. In spite of local and internal remedies, such as ice, alum, iron, ergot, erigeron, gallic acid, etc., the epistaxis persisted until the death of the patient, the bleeding sometimes stopping for an hour or two, apparently without refer-

ence to treatment. He became extremely anæmic, and died of general exhaustion. A few notes were made on his condition the day before his death. The limbs of both sides appeared to be about equally helpless. The mouth was now drawn very slightly to the right. Little could be made out certainly with reference to sensation. He still appeared, however, to be less sensitive to impressions on the left side of the face and in the limbs of the right side. Both pupils were small, the left a little smaller than the right. The eyes still looked to the right; the deviation, however, was not quite as great as when he was first admitted. The conjunctiva of the right eye, from the cornea to the internal canthus, was much injected.

Autopsy.—The scalp was found adherent to the skull in the line of the scar in the left squamoso-temporal region. A narrow fissure was present in the skull beneath the scar. The internal table of the skull was fissured for the distance of half an inch, the fracture corresponding to a portion of the external cleft. The fracture was a simple crack or break, no bone being depressed or displaced. The dura mater was slightly adherent along the internal fissure, and exactly beneath the point of adhesion, on the inner surface of the dura mater, was a hard, yellowish tumor, no larger than a pea. It was attached below to the pia mater, and caused a slight depression in the first temporal convolution, about the junction of its middle and posterior thirds, and half way between the parallel fissure and the horizontal branch of the Sylvian fissure. No other lesion of the surface of the brain, or of the ganglia, centrum ovale, or cranial nerves, was discovered. The pia mater of the middle region of the base was hyperæmic and not quite transparent. On exposing the floor of the fourth ventricle a distinct bulging of its left upper portion was observed. This proved to be due to a tumor about half an inch in diameter. It was situated in the body of the pons, both the anterior and posterior surfaces of the latter retaining their integrity. It was distinctly limited to the left upper

quarter of the pons, coming close to, but not crossing, the median line. It was found on section to be of firm consistence and of a greenish-gray color.

Tubercular deposits were found at the apex of the left lung. The heart walls were a little softened. The liver was intensely cirrhotic, and a small whitish tumor was embedded in the upper surface of its left lobe. The spleen was soft and about twice the normal size. Both kidneys were fatty.

The tumor of the pons was examined microscopically by Drs. J. H. C. Simes and H. Formad, who concluded that it was a gumma.

Both eyeballs and the optic nerves were carefully removed and placed in the hands of Dr. E. O. Shakespeare, who furnished me with the following report upon the microscopical examination of the optic nerves:

“After proper hardening, thin sections of the anterior third of the optic nerve, including its entrance into the eye, were made so that the sections were longitudinal to the course of the nerve. In one of the eyes the optic disc was slightly more prominent than normal. The walls, both of the arteries and veins, of the optic papilla were somewhat sclerosed. Their lining endothelium was slightly irritated. The connective tissue between the nerve bundles of the papilla was in a state of considerable cellular hyperplasia. Their corresponding capillary blood-vessels were apparently more numerous than usual, while their walls were surrounded by numerous leucocytes. As the position of the lamina cribrosa was approached, the cellular hyperplasia was found to increase, and large numbers of nuclei were present upon the fibres of the lamina cribrosa itself. This cellular multiplication extended far back of the nerve entrance into the eyeball. The subvaginal and subdural spaces of the sheath of the optic nerve were considerably enlarged, and

in the anterior portion, adjacent to the eyeball, the walls and the enclosed fibrous trabeculæ were in a state of inflammatory irritation. The nerve from the other eye was in practically the same condition. From the examination, it would appear that there was present a descending neuritis of subacute character."

Remarks.—The peculiar ocular symptoms present in this case were doubtless due to the tumor of the pons Varolii. Conjugate deviation of the eyes, with rotation of the head, is a condition often present in the early stages of apoplectic attacks. The patient is found with both eyes turned to one side and slightly upward, as if looking over one or the other shoulder, the head and neck being usually rotated in the same direction. Sometimes the deviation is slight, sometimes it is marked. Frequently the muscles of the neck on one side are rigid. The eyes are commonly motionless, but occasionally exhibit oscillations. This sign, well known to neurologists, usually disappears in a few hours or days, although it occasionally persists for a long time.

Vulpian was probably the first to study thoroughly conjugate deviation. The sign, when associated with disease of the pons, was supposed by him and by others to be connected in some way with the rotatory manifestations exhibited by animals after certain injuries to the pons. Transverse section across the longitudinal fibres of the anterior portions of the pons produces, according to Schiff, deviation of the anterior limbs (as in section of a cerebral peduncle), with extreme flexion of the body in a horizontal plane toward the opposite side, and very imperfect movements of the posterior limbs on the other side. Rotation in a very small circle develops in consequence of this paralysis (Rosenthal's "Diseases of the Nervous System," vol. i, p. 125). The movements of partial rotation are caused, according to Schiff, by a partial lesion of the most

posterior of the transverse fibres of the pons, which is followed in animals by rotation of the cervical vertebræ (with the lateral part of the head directed downward, the snout directed obliquely upward and to the side).

This lateral deviation, both of head and eyes, occurs, however, not only from lesions of the pons and cerebellar peduncles, but also from disease or injury of various parts of the cerebrum—of the cortex, centrum ovale, ganglia, capsules, and cerebral peduncles. It is always a matter of interest, and sometimes of importance, with reference especially to prognosis, to determine what is the probable seat of lesion as indicated by the deviation and rotation.

Lockhart Clarke, Prevost, Brown-Séquard, and Bastian, among others, have devoted considerable attention to this subject. To Prevost we owe an interesting memoir. Bastian, in his work on "Paralysis from Brain Disease," summarizes the subject up to the date of publication (1875). Ferrier, Priestly Smith, and Hughlings Jackson have investigated the relations which cortical lesions bear to the deviation of the eyes and head.

It has been pointed out by several of the observers alluded to that when the lesion is of the cerebrum the deviation is usually toward the side of the brain affected, and therefore away from the side of the body which is paralyzed. In a case of ordinary left hemiplegia, it is toward the right; in one of right hemiplegia, toward the left. In several cases of limited disease of the pons, however, it has been observed that the deviation has been away from the side of the lesion. In the case here recorded, the conjugate deviation was to the right, while the tumor was entirely to the left of the median line, thus carrying out what appears to be the usual rule with reference to lesions of the pons.

During the life of the patient, it was a question whether the case was not one of oculomotor monoplegia or mono-

spasm from lesion of cortical centres. I believe, with Hughlings Jackson, that ocular, and, indeed, all other movements, are in some way represented in the cerebral convolutions. In the *British Medical Journal* for June 2, 1877, Jackson discusses the subject of disorders of ocular movements from disease of nerve centres. The right corpus striatum is damaged, left hemiplegia results, and the eyes and head often turn to the right for some hours or days. The healthy nervous arrangement for this lateral movement has been likened by Foville to the arrangement of reins for driving two horses. What occurs in lateral deviation is analogous to dropping one rein; the other pulls the heads of both horses to one side. The lateral deviation shows, according to Jackson, that after the nerve fibres of the ocular nerve-trunks have entered the central nervous system, they are probably redistributed into several centres. The nerve fibres of the ocular muscles are rearranged in each cerebral hemisphere in complete ways for particular movements of both eyeballs. There is no such thing as paralysis of the muscles supplied by the third nerve or sixth nerve from disease above the crus cerebri, but the movement for turning the two eyes is represented still higher than the corpus striatum.

Ferrier found that irritation of a certain limited area of the surface of the brain of the monkey, corresponding to a region in the brain of man at the base of the first frontal, and extending partly into the second frontal, convolution, caused elevation of the eyelids, dilatation of the pupils, conjugate deviation of the eyes, and turning of the head to the opposite side.

Priestly Smith (*Ophthalmological Hospital Reports*, vol. ix, p. 428) concludes that the chief coördinations in the brain of ocular movements are of four kinds: 1. Movements of both eyes to the right. 2. Movements of both

eyes to the left. 3. Movements of both eyes downward and inward, narrowing of the pupils, and contraction of the ciliary muscles, producing increased convergence and accommodation. 4. Movements of both eyes upward and outward, producing diminished convergence, and accompanied by, though not actively producing, widening of the pupils and relaxation of accommodation. These several forms of compound movements are produced by the action of distinct brain centres, and disease may destroy or irritate one or other of the four, and leave the others intact.

A few cases are on record in which conjugate deviation of the eyes alone has occurred, constituting, according to Ferrier, what may be regarded either as unilateral oculomotor monoplegia or monospasm. Five such cases, or, rather, supposed cases, for an autopsy was held in only one instance, have been collected by Ferrier (*"The Localization of Cerebral Disease,"* New York, G. P. Putnam's Sons, 1879). Three of these were reported by Priestly Smith, whom I have just quoted. In the first case, after an attack of pain in the head, giddiness, and vomiting, the eyes became persistently turned to the right, with complete inability to turn them to the left. The right side of the forehead was marked with wrinkles; the left eyelids were more open than the right; there was frequent winking of the eyelids, and synchronous but imperfect action of the left. Gradually the right eye recovered its mobility to the left, while the outward motion of the left eye still continued very imperfect, and caused double vision. Three months after the first appearance of the symptoms the patient became affected with left hemiplegia. A fortnight later the right side became paretic. In a second case, the symptoms noticeable were deviation of the eyes to the right, facial paralysis on the left, and some paralysis in the left limbs. In a third case, severe pain in the right side of the head

and face had been followed by "squinting of both eyes to the right." When first seen, twelve months after the attack, the left external rectus appeared to be paralyzed. It is suggested, however, that as both eyes had at first been turned to the right, the eye symptoms are explicable, as in the two preceding cases, by the recovery of the right eye, while the outward movement of the left remains paralyzed.

Dr. Carroll, of Staten Island, furnished Dr. Ferrier with the particulars of another case. A child, aged five months, fell six feet, and was stunned for a few minutes. No paralysis occurred, but conjugate deviation of the eyes and rotation of the head to the right, with, at first, dilatation of the pupils, were noticed. A linear fracture was detected in the right parietal bone, about midway between the squamous and sagittal sutures, and intersecting a vertical line drawn upward from the auditory meatus. Pressure at the seat of injury caused a distinct increase of the deviation. Ferrier supposed the symptoms to be accounted for by unantagonized action of the left centre, from hemorrhagic lesion of the right.

Chouppe, quoted by Landouzy, relates the case of a lad, aged 19, who showed symptoms of tubercular meningitis, in which, in addition to pain, vomiting, etc., the most remarkable symptom was a rotation of the head and eyes to the right. After death a patch of disease, free from granulation, and quite superficial, of the size of a franc piece, was found in the "superior part of the middle frontal convolution" of the left hemisphere. Ferrier thinks that the seat of the lesion probably corresponded with the oculomotor centre in the brain of the monkey.

I have taken the liberty to quote a condensed account of these cases in order to fully bring forward the subject, the literature of which is as yet scanty. A similarity will be

observed between the symptoms presented by my case and those exhibited by some of the cases collected by Ferrier. In the first case, reported by Priestly Smith, the symptoms are strikingly similar to those shown by my patient—conjugate deviation of the eyes to the right, with complete inability to turn them to the left; more marked wrinkling of the right side of the forehead than of the left; hemiplegic or hemiparetic symptoms first of one side and then of the other. In the absence of an autopsy on the case of Priestly Smith, and in the light of the *post-mortem* examination here reported, it may, indeed, be considered doubtful whether his patient suffered from a cortical lesion.

It does not seem probable that the fissured skull, and the small meningeal tumor in connection with it, had any thing to do with the production of the ocular symptoms. The lesion was comparatively remote from the oculomotor centres of Ferrier, at the bases of the first and second frontal convolutions. It is true that efforts have been made to localize a centre for the levator palpebræ superioris muscle in the angular gyrus, and if such could be made out to exist in this region, it is probable that centres for other ocular movements would be in proximity. The weight of evidence, both physiological and pathological, is, however, against this localization. The meningeal tumor was, in addition, very small, and was a little too far forward for the angular gyrus proper. Both the ocular and other phenomena of the case are, I think, well accounted for by the pontine lesion.

Cases like that reported in the present paper are far from discouraging with reference to the local diagnosis of brain lesions. They serve simply to give additional zest to close investigation. I conclude, from a study of this case, that tumors limited to one-half of the upper portion of the body of the pons will cause conjugate deviation of the eyes and

rotation of the head away from the side of the lesion. It is quite likely that if the lesion is sufficiently limited the ocular deviation may stand alone. In the vast majority of cases, however, owing to the narrow limits of the pons and its position with reference to connecting tracts both from the cerebrum and cerebellum, other symptoms will be present. In this last fact we have the clue to the differential diagnosis of the pontine lesions from disease of the oculomotor centres of the convolutions.

The paralysis or spasm of face or limbs, that may be associated with the ocular symptoms, is more likely in cases of cortical disease to be unilateral than in lesions of the pons. The oculomotor centres of the cortex are near to the crural, brachial, and facial centres, and these may be involved in the same lesion, or may become involved by extension, and thus arise paralytic or spasmodic symptoms in face or limbs, or both, on the opposite side of the body. Both sides of the body would present symptoms only after extension of the lesion to both hemispheres, which is not likely to occur. Even when a lesion is strictly limited to one-half of the pons, the nuclei and tracts for both sides are so close together that in the case of tumors and hemorrhages the uninjured side will be more or less involved by pressure. In the patient whose history I have just given, the paresis was first noticed upon the right side, but both sides showed signs of paralysis before his death. Disturbances of sensation are more likely to be present in pontine lesions than in cases of cortical oculomotor disease. Such sensory disorders, according to Ladame, are to be found in about one-third of the cases of tumor of the pons. According to Rosenthal, with whom I entirely agree, careful examination will show them to be even more frequent. Supposing the bases of the first and second frontal convolutions to cover the true oculomotor centres, these are compara-

tively remote from the sensory zone, which is in the parieto-temporal and occipital regions. Some changes of sensibility were present in the case here recorded. Contraction of the pupils, varying in degree for the two eyes, pointed also to disease of the pons. Depressed farado-contractility and peculiarities of temperature would have helped to confirm the diagnosis of tumors of the pons, but these, by an unfortunate omission, in the present instance were not studied.

CASES OF POLIOMYELITIS ANTERIOR IN WHICH THE ABDOMINAL MUSCLES WERE AFFECTED.*

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HAVING had within a year two cases of infantile spinal paralysis (poliomyelitis anterior) in which the abdominal muscles of one side were involved, a condition I had not observed before, I determined to report them, together with a review of the similar cases to be found on record in the literature of the disease, in its infantile and adult forms, at my command. While in the great majority of cases of this disease the paralysis is limited to one or more of the extremities, still, cases have been observed, either in the infant or adult, in which were affected the facial, ocular, and laryngeal muscles, the muscles of deglutition, and those of the neck, the thoracic muscles of respiration, and those of the back, as well as the voluntary muscles of the rectum and the bladder; some of them very rarely, but others quite frequently. Involvement of the abdominal muscles, however, is one of the rarest events of this disease.

In reviewing the literature of this subject, out of 125 references to articles by 120 authors which I have collected, I was able to consult 100, which contain reports of over 600

* Read before the New York Neurological Society, March 1, 1881.

cases of infantile, and over 50 of the adult form. Out of this number I found but 2 cases in which involvement of the abdominal muscles was reported in the former, and not more than 7 in the latter group. In addition to this an analysis of 50 cases of the infantile form, from the record of the Department for Nervous Diseases at Manhattan Eye and Ear Hospital, a portion of them having been under my own care, the majority, however, under Dr. E. C. Seguin's, include the two cases of my own which I now report. Over 50 cases of the infantile form, recorded at Dr. E. C. Seguin's clinic for nervous diseases at the College of Physicians and Surgeons, fail to exhibit any additional cases of this character. Dr. Gibney informs me that he has never seen such a case at the Hospital for the Relief of the Ruptured and Crippled, although they have had over one thousand cases of paralysis in children, the majority belonging to the variety in question. My friend, Dr. E. C. Seguin, had observed but one such case in the infant, which is one of two cases on record. It is to be found in Dr. Newton M. Shaffer's monograph on Pott's disease. Dr. Shaffer has seen but one other case, to which he has kindly permitted me to refer, although many hundred cases of infantile spinal paralysis have been under his observation at the New York Orthopædic Hospital. Out of this large number of cases of infantile myelitis of the anterior horns (from 1,500 to 2,000 cases) I have found but five cases in which the abdominal muscles were affected, making it an extremely rare condition. It may be borne in mind, however, that in many it may have been overlooked, or, if observed, perhaps not recorded.

It is frequent to find reference to cases in which, during the first days of the disease, the child appeared to have lost *all* voluntary power, but this condition soon passes off, and it is indeed difficult to say whether it be due to a true

paralysis or to general asthenia. It is rare to find any reference to the abdominal muscles even in general works on the subject. Heine speaks of general distention of the abdomen due to spinal deformity, but not of paralysis of the abdominal muscles. Leyden is one of the few who mentions the subject. He states that "the muscles of the trunk, notably those of the back, and also those of the abdomen, may be involved ;" he cites no cases however.

CASE. 1.—Duchenne (fils). *Atrophic paralysis of the trunk; right, and of both inferior extremities.*

In the beginning of 1862, M. Bouvier reported to M. le Dr. Duchenne (de Boulogne) an infant of ten months, who, at four months, was attacked with generalized atrophic paralysis after a fever of 48 hours' duration. Movements were preserved in the superior extremities only. In the lower extremities the majority of the muscles gave no sign of existence, neither by electrical exploration nor by voluntary efforts. On the right side a great many of the muscles of the trunk and of the abdomen were atrophied. This produced a considerable lateral inclination of the spine with a right dorsal convexity; the abdominal walls being thinned on this side electrical excitation failed to produce muscular contraction, and the abdominal viscera presented the appearance of a hernia, the abdomen being depressed on the left side only, during the cries of the infant, while on the right, the intestines presented in relief, the hernia being considerably augmented. The child was not seen again. (Translated from *Arch. general*, vol., 2, p. 45, 1864.)

CASE 2.—I am indebted to Drs. Seguin and Schaffer for this case. I quote from Dr. Schaffer's monograph on Pott's disease: "The patient was six years old, and was placed under my care by Drs. W. H. Draper and E. C. Seguin. The original lesion was a poliomyelitis. Dr. Seguin furnished me with a memorandum of the muscles primarily affected. Those partially paralyzed (which recovered wholly under Dr. Seguin's treatment) were the muscles of the neck, arm, and thigh (left side). Those wholly paralyzed, and which did not recover, were the left serratus magnus, the left transversalis, and obliquus externus and the supra- and infra-spinati of the same side. The vertebral column presented an inflexible dorsal curvature toward the paralyzed side with the usual

compensatory (?) curve in the lumbar region. The patient walks well and has no loss of power in the superior members. There was marked contraction of the unparalyzed antagonists of the opposite (right) side."

CASE 3.—Referred to by Dr. Schaffer's permission, being a case he has already presented at a clinical lecture. E. H. G., a female, was affected with paralysis of the lower extremities, and of the back and abdomen of one side. (Photographs showing the extent of the atrophy were exhibited.)

Now follow my own cases :

CASE 4.—Male, æt. 3. In July, 1879, at the age of 20 months, had a severe attack of measles. A month later his mother observed, one morning, after he had passed a restless night, that he could not walk ; she took him in her arms, when he became unconscious, in which state he remained from 9 A.M. until 5 P.M. The following day (Sunday) he had slight epileptiform attacks, the eyes turning to one side, the hands being firmly clinched. On Monday he was still unable to walk, nor could he talk, although before the attack he could say "papa," "mamma," and a few other words. His mother noticed that the abdomen was distended, and after a few days that the left side was more distended than the right, and that both legs were paralyzed, the right being more completely so than the left. He could not sit upright. The arms were not affected, nor the muscles of the head, neck, or thorax. There was no bladder trouble, but constipation was marked for several days ; speech did not return, though he appeared as intelligent as ever. There was no affection of sensation, either general or special. The lower extremities began to show signs of wasting very early. On Aug. 30, 1879, he was referred to me for electrical treatment, at Manhattan Hospital, from Dr. E. C. Seguin's clinic at the College of Physicians and Surgeons. He was unable to sit or walk. There was absence of voluntary movements in both lower extremities ; the tissues were cold and flabby, the right more than the left ; the reflexes were absent ; sensibility preserved. The abdomen was distended to a marked degree on the left side, a decided bulging appearing over the muscular portion of the transversalis as large as one's fist. The muscles of the back on the corresponding side appeared softer and weaker than on the opposite side. The remaining muscles of the body were unaffected. The electrical examination revealed the presence of

the "degeneration reaction" in the lower extremities; namely, absence of farado-muscular contractility on muscle and nerve, absence of galvano-muscular contractility on the nerve, but exaltation of the same on the muscles, with qualitative changes consisting of a reversal of the formula of contraction, the anodal closing contraction being greater than the kathodal closing contraction ($An. C.C. > Ka. C.C.$), the contractions being slower than in a healthy muscle. This difference was most marked on the right side, and particularly in the anterior tibial group of muscles. The reactions of the individual muscles, and the variations from time to time as they appear on the records, are omitted.

It is next to an impossibility to test accurately, with electricity, the abdominal muscles of a crying child. I never succeeded in making a satisfactory examination of them in this case. There was no reaction to the faradic current on the affected side in the transversalis and oblique muscles; it was present, but diminished in the rectus; with galvanism, however, the results were too uncertain to determine whether the degeneration reaction was present or not. After a few days the abdomen, which was distended by gaseous accumulations, diminished in size; and when the child was lying upon his back nothing abnormal was observed; but during the execution of other movements, which required the use of the abdominal muscles, the whole left side of the abdomen became more prominent, and even the rectus failed to contract as powerfully as on the healthy side. He was treated by an ascending spinal galvanic current—the "movable stable" method of Erb—and by local applications of the interrupted galvanic current, sufficiently strong to produce contractions. In consequence of the paretic muscles of the abdomen being put upon the stretch by the accumulation of gases, and by violent respiratory movements, the protrusion became more and more marked as the muscular atrophic changes continued. It became necessary, therefore, to devise some support to prevent this. A corslet or band, knit of cotton, and which would yield to a slight degree only, was made by the mother, and answered an excellent purpose, as it allowed a certain freedom of movement to the muscles, but not sufficient to produce stretching to an unnatural degree. This, I believe, to be an important point, too frequently forgotten in the treatment by supporting apparatus of deformities from paralysis. Absolute rest from the immobilization of a part can only tend to hasten atrophic changes, while movements within certain limits, besides inducing improvement in the general nutrition of the part, permits that ex-

ercise of functions so necessary to the continued repair and growth of muscular tissue in the muscles antagonistic to those paralyzed, and also in those muscular fibres which have not lost their function entirely through degeneration changes in the fibres themselves or from interruption of their neural connections. I objected, therefore, to the use of plaster of Paris and other unyielding corslets which had been recommended, and continued to use the knit band with satisfactory results. The condition, which was growing worse before treatment, improved quite rapidly under the use of the bandage and galvanism.

Oct. 7th.—There is reaction to the faradic current in the muscles of the left inferior extremity, even in the anterior tibial group, but none on the right side. There is considerable voluntary power on the left but none on the right side.

Oct. 15th.—Is able to sit up alone.

Nov. 12th.—He walks for the first time. Some voluntary movement has returned in all the muscles, except the right anterior tibial group.

On two occasions treatment was discontinued for a week or two, and each time he became worse; he recovered, however, when treatment was resumed.

Jan. 8, 1881.—Slight voluntary movements are to be seen in the toes of the right foot.

In his present condition the left lower extremity appears well developed and of normal temperature and color; there is a slight tendency to talipes (valgus), which is being antagonized by an elastic support from the inner side of the foot to the knee. The circumference of the right leg is 20 cm., of the left leg, 22 cm., of the right thigh, 29 cm., of the left thigh, 29 cm. The right extremity is cold and somewhat flabby. The muscles of the anterior group are the only ones which do not exhibit more or less voluntary power. Tendon reflexes absent. The paretic abdominal muscles have become stronger, but the bulging over the transversalis muscle is still present when he cries, though very much diminished from its previous condition. The muscles of the back in the lumbar region are not as firm as upon the healthy side. There is a slight tendency to lordosis, and a slight rotation; no scoliosis. The hemi-circumference around the abdomen on the paretic side measures 3 c.m. more than on the normal side. The electrical examination reveals upon the left side, to faradism, moderate reaction in all muscles; to galvanism, Ka. C. C. slightly > An. C. C. in muscles of the thigh. In muscles of the leg,

Ka. C. C. = An. C. C. Upon the right side, to faradism, no reaction except with a powerful current on the thigh muscles; to galvanism, Ka. C. C. = An. C. C. In anterior and posterior tibial groups An. C. C. > Ka. C. C. In abdominal muscles of paretic (left) side, to faradism, diminished reaction in rectus, still greater diminution in oblique muscles, and in transversalis probably absent; to galvanism, Ka. C. C. > An. C. C. in rectus, in other muscles, doubtful respecting the formula of contraction.

CASE 5.—Male, æt. 4. July 7, 1880, he fell from a third-story window (54 feet), striking on a two-wheeled hand-cart, which tipped, lessening the force of the fall, and throwing him to the ground. He was not unconscious, but called at once "Mama." Bruises were found on the legs only; no fractures or dislocations. He was feverish and two weak to walk, but was bright and talkative. In a week he could sit up. At the beginning of the third week after the accident he had a fever and was restless at night; the next morning the fever had disappeared, but he could not sit up, and was unable to move the right leg. He was referred to me by Dr. Richard Wiener, Aug. 6th. Examination revealed an absence of voluntary power in the right lower extremity in both thigh and leg muscles; no abnormality of sensation; absence of the tendon reflex. The left leg was normal, and at this time no involvement of other muscles was observed. There was no bladder trouble. Electrical examination showed the "degeneration reaction" in all muscles of the right thigh and leg. Normal reaction to faradism and galvanism in opposite side and in the upper extremities. After two weeks' treatment, as in the preceding case, he was able to sit alone; about this time distension of the left side of the abdomen was first observed, which increased until it was almost the counterpart of the first case. The muscles of the back in the lumbar regions were not as strong as on the opposite side. The same form of support and treatment was ordered, and after two or three weeks improvement began. A few fasciculi of the right internal oblique just above Poupart's ligament became weak, giving rise to a slight protrusion. The electrical reactions in the abdominal muscles were as follows: to faradism, diminished in the left rectus as compared with the right; slight reaction in oblique muscles, but none in transversalis. To galvanism, left side, in rectus, Ka. C. C. > An. C. C. — 24 cells; in oblique and transversalis, An. C. C. > or = Ka. C. C. Right side, normal reaction. Very little improvement has taken place in the paralyzed extremity.

Jan. 15, 1881.—He commenced to move the toes, but voluntary power has not returned in the other muscles. The nutrition of the feet has improved. The measurements are: Right calf, 18 cm.; left, 20 cm.; right thigh, 21 cm.; left, 27 cm. An obliquity of the pelvis and a slight compensatory scoliosis is observed when standing, but in the prone position the spinal column presents no lateral curvature. At times there is slight rotation. Voluntary power has returned in the oblique muscles and rectus to a considerable degree.

The fact that in both these cases the abdominal protrusion was at first scarcely noticeable, but gradually increased, is probably due to the fact that when degeneration took place in the muscles, the remaining tissues, deprived of this important means of support, became stretched by the abdominal viscera in violent respiratory movements. There is reason to hope, after the improvement which has taken place and is still going on, that great deformity, consequent upon the inequality of muscular power on the two sides of the spinal column, will be avoided. In the second case the condition of the right lower extremity rendered the prognosis far from hopeful.

Of cases of poliomyelitis anterior adultorum in which the abdominal muscles were affected, I found several cases reported, to which I shall refer very briefly.

Cumming reports a case (*Dublin Quart. Jour.*, 1869, vol. i, p. 471) in which he states that all voluntary motion was absent below the neck, except slight movement of the right shoulder; this was during the first days of the disease; no direct mention of the abdominal muscles is made; it is, therefore, uncertain whether this case should be included or not.

Goldammer reports a case in a male, æt. 32 (*Berlin Klin. Wochen.*, No. 25, 1866), in which the muscles of the extremities, back, and abdomen, were paretic, but it is doubtful whether atrophy followed and the electro-muscular contrac-

tility was preserved, making the diagnosis of the case doubtful.

Lanceraux made an autopsy upon a young man who was first affected with poliomyelitis at the age of 16. No reference is made to the presence of paralysis of the abdominal muscles in the history, but atrophic changes were found in the abdominal muscles of the right side as well as in those of the left superior and right inferior extremities. This case is cited by Petit, fils (1873).

In one of Charcot's cases (No. 10 of Seguin's collection, in his "Myelitis of the Ant. Horns") there remained atrophy of the left nates, leg, and foot, of the anterior part of the right thigh, and of the left lower abdominal muscles, in which electro-muscular contractility was lost.

Dr. F. T. Miles reported a case of acute spinal paralysis before the American Neurological Society in 1875, in which the abdominal muscles were involved.

Dr. Bull reports (*London Lancet*, 1880, vol. 1, p. 563) a case of acute spinal paralysis in an adult in which, at first, there was complete loss of voluntary motion in upper and lower limbs, back, neck, and abdomen.

Kahler and Pick report (*Vierteljahrs & pract. H. K.*, Prag, 1879,) a case of subacute poliomyelitis in an adult in which the "degeneration reaction" was present in the abdominal muscles of one side.

These are the only cases which I have been able to find, and some of them are doubtful.

Adamkiewicz reported two cases in the *Charite Annalen*, Berlin, 1879—one of poliomyelitis and one of lead paralysis. In the latter the abdominal muscles were involved and furnished the "degeneration reaction," while in the former this was not the case. He makes a plea for the identity of the two affections from a pathologico-anatomical standpoint, a view maintained, and with good reason, by many eminent authorities.

HOW TO USE THE BROMIDES.*

BY GEORGE M. BEARD, A.M., M.D.,

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THE bromides are among the few great and sure remedies that medicine has at its command. They take rank with opium, quinine, and electricity, as forces that we can, in a good degree, depend upon to obtain positive results; and the introduction of them into medicine has made an era in the treatment of diseases of the nervous system.

Without the bromides we should be—in the treatment of functional nervous diseases—as much disarmed as one would be in the treatment of malaria without quinine. To a very considerable extent the bromides have taken the place of opium, which was formerly borne much better than now. Very many nervous patients, indeed, are so sensitive to opium—being kept awake instead of being put to sleep by it—that, without the bromides, we should be, in many cases, almost helpless; particularly where immediate sedative effects are required.

It is because the bromides are remedies of such enormous efficiency and of such certainty in their action that they have been over-used, just as the other great remedies, opium, quinine, iron, and calomel, have been over-used; and hence there has been reaction against their use; a dis-

* Read before the American Neurological Association, June, 1881.

position to reproach them as enemies, rather than praise them as friends of the nervous.

The suggestions that I am here to give in regard to the use of the bromides may be put in these propositions. These propositions apply especially to *other functional nervous diseases than epilepsy*, since the use of the bromides in epilepsy and epileptoidal states has been more studied and is more generally understood. It is not generally known that the bromides are of far greater value in many other nervous diseases than in epilepsy.

First. The object of using the bromides is usually to produce a definite effect of *bromization* in a greater or less degree.

Bromization is an abnormal state ; is, in a certain sense, disease artificially produced ; but it is one of the canons of therapeutics that we can cure disease by disease ; one set of symptoms being used as scourges to drive out another set of symptoms.

Bromization is a condition of degrees, ranging from very mild sleepiness or general sedation to profound stupor and unconsciousness, insanity through the bromic breath, bromic acne, profound muscular debility, difficulty of articulation, and lowering of all the functions. Drowsiness in the daytime is not always the first symptom of bromization, although it usually is. In some cases aching of the limbs, perfectly simulating a common cold, is first noticed. Debility sometimes precedes drowsiness. All these, and the severer symptoms, may persist for several days after ceasing to take the drug ; therefore passengers wishing to avoid sea-sickness, and who go on board of the steamer well bromized, may not need to take any more of the medicine during the entire voyage to Europe, unless the weather should be rough.

In [therapeutics the severest effects of bromization, or

bordering on the severest (for the very severest mean death—since we can kill one with the bromides, just as surely as we can with the pistol, if we but give them freely enough and long enough—), are never needed ; the medium effects may be required in certain diseases—as in epilepsy—for certain emergencies or crises, in hysteria or neurasthenia, and also as preventives or curatives in sea-sickness ; but the mild and incipient symptoms are all we need to the majority of cases where the bromides are to be given.

It is possible, it is even probable, that good effects come from the bromides without any real symptoms of positive bromization ; but, usually, little demonstrable good comes from their use unless bromization is produced ; for sleep, by night or day, is itself in a mild phase, one of the symptoms of bromization.

Last year a druggist in Liverpool told me that he was putting up bromide of sodium in doses of ten grains for those who were going to sea and who supposed that they were taking the treatment recommended in my work on sea-sickness. Those who take the bromides in that way will be likely to fail in their attempt to cure or prevent sea-sickness, and they will also fail in the treatment of very many other nervous diseases.

Secondly. To rapidly induce bromization it is usually an advantage—if not absolutely necessary—to give immense doses ; all the way from thirty to one hundred grains, more or less.

Placing aside idiosyncrasies—for some persons are unduly susceptible to the bromides, as some are unduly susceptible to opium or quinine—placing aside these idiosyncrasies, it is not of much use to give bromides, for any purpose whatsoever, in doses of less than twenty or thirty grains ; it is better to give—except in initial doses, where we wish to test the temperament of the patient—as much

as half a drachm, if not more. I rarely prescribe so small a dose as twenty grains, and often prescribe as high as a drachm, or more. It seems to be pretty clear that it is possible to give the bromides in small doses, say fifteen or twenty grains, two or three times a day, for a long period, without getting any effect, good or bad; whereas, if the same patients take the same remedy in doses of thirty or sixty grains, for *a few days* only, they become more or less bromized, and with all the good effects that bromization can produce.

In epilepsy, the necessity of giving doses of considerable size is recognized more and more; but it is not generally allowed, even by neurologists, that in neurasthenia or hysteria doses of even greater size are admissible, proper, and necessary, if we would get the results we seek.

In many cases a single large dose of bromide, say one hundred or one hundred and twenty grains, or even a larger amount, given in a tumbler of water, may be sufficient of itself, without any repetition, in any quantity, to break up an attack of hysteria or sick headache or seasickness; whereas, the same case in the same condition, treated by divided doses of the same remedy, might not be affected at all.

It sometimes seems to be necessary to overwhelm the nervous system with the sedative effects of the bromide, in order to get bromization.

The book doses are poor guides for those who wish to get the therapeutic effect of the bromides.

Thirdly. The bromides should be given in these immense doses for a *short time* only, save in epilepsy and epileptoidal conditions. The evil effects of the bromides, of which we hear so much, do not appear, as a rule, except when the dose is very large, from taking them a short time, say a few days or a week, more or less, but from

keeping them up weeks or months, without any intermission, or without the counteracting effects of tonics, or without the close and careful study of the idiosyncrasy, which is so important in the use of this, as well as in the use of all other powerful remedies.

Indeed, it is not safe or wise to give these large doses of bromide to any patient with whose constitution we are not familiar, without keeping him under our eye, and watching the effects closely. The bromides are powerful remedies, and they may be dangerous as well as powerful, but if we use them wisely, we can obtain and utilize their full power without the danger.

In some cases bromization appears very rapidly indeed; in less than twenty-four hours after beginning treatment with these large doses. Sometimes a single large dose of one hundred grains or more is enough without any more (small quantity or large) to bromize a person. Other persons may take these large doses for three or four days, or even longer, without getting any easily demonstrable effects of bromization; they do not feel especially sleepy by day—which is one of the important symptoms—and the fauces have not lost their sensitiveness enough to prevent gagging, when irritated by the finger; and there is no special weakness; but if these same cases go on, perhaps for a day or two more, bromization may spring upon them in full force, without any warning, all, or many of the symptoms at once; and this is one of the risks we run in using the bromides.

A case very remarkable indeed, illustrative of this, has come under my notice lately. A lady, who had taken bromides as preventives of sea-sickness, felt no influence from the remedy, except that she was not sea-sick, as she had always been in her previous trips across the ocean. She took her meals as usual, and kept on with the large doses, which was both unnecessary and unwise, under the

circumstances, as there was no severe storm. After three or four days, however, she became very sleepy, and for three days slept almost continuously. When rallied, she was dull and stupid ; her friends got her out on deck, but she could not continue her conversation, and preferred to go below, where she could sleep. She took no more of the bromide, but the effects remained, even after she landed and went to London, but gradually she returned to her normal condition. All this could have been avoided, should have been avoided, and would have been avoided, if the directions which I have given for the use of the bromides in sea-sickness had been carried out.

In the party to which this lady belonged there were two others who took the bromides as she did, for a few days, but they stopped before she did ; a few doses absolutely prevented sea-sickness, although in all previous voyages one of them had suffered severely from dock to dock ; and on landing they thought only of their voyage as a very delightful experience.

EARLY BROMIZATION.

This late appearing of the effect of the bromides, it is important to recognize, and for want of recognition of this, many fail of obtaining sleep by the use of this remedy. They order a dose of perhaps fifteen or twenty grains, or possibly even larger, to be taken at night, and wonder that they get no sleep therefrom. There are some who are bromized so quickly as to get benefit from taking it this way ; but, as a law, it is far better, if we are to give but one dose, to give it earlier in the day ; better still to give two doses, one in the morning, and the other at night. Failures beyond number in the use of the bromides would be prevented if this last fact were known. No one who knows how to use the bromides will question their hypnotic power.

LATE BROMIZATION.

On the other hand, very interesting indeed are the instances where bromization is rapidly produced. In my own office a lady to whom I gave a large dose of bromide of potassium (100 grains) was bromized in less than twenty minutes, and in half an hour was unconscious, almost moribund; the feet and hands were cold, the pulse thready and rapid, and for two hours it was, or seemed to be, a fight for life, as though she were battling with the effects of some terrible poison, and for several days she was confined to her bed; but even in this case there were no permanently bad results.

When I was studying the Maine Jumpers,¹ last year, I tried the experiment of thoroughly bromizing one of the subjects, in order to see if it would have any effect over the phenomena. I poured the drug down him in large and repeated doses, in order to get him rapidly under its influence. I knew that I was dealing with a strong, healthy man, one who probably would not be susceptible to large doses, and I did not know how much I gave him, but this I do know, that I would never give the same quantity to any one again, under any circumstances. He went rapidly under its influence, had difficulties both of speech and walking, was obliged to go to bed, and was kept in bed for a number of days, and at one time was thought by those who took care of him to be dying, or in danger of dying. He recovered, however, and was not at all benefited, as far as the jumping was concerned, either temporarily or permanently; a very interesting confirmation of the conclusion I then reached, that the phenomena of jumping were psychological (trancoidal) rather than physiological.

In another case where the bromides were taken for

¹ *Popular Science Monthly*, Dec., 1880.

sea-sickness, temporary helplessness and blindness were produced. Dr. Reed, a young physician, of Hartford, Conn., is reported to have jumped overboard during an attack of insanity, which was apparently induced by taking eleven ounces of bromide of sodium. It is quite probable that this report is correct; I have seen many of the physical symptoms of general paresis produced by bromization. There is no question that cases of bromization are, now and then, mistaken for cases of insanity. It is both interesting and consoling to know that the recovery even from these severe symptoms of bromization is complete and satisfactory. Knowing this fact, I have in extreme cases of opium-eating bromized the patient profoundly for a few days.

It is almost inevitable that we ask how it is that the bromides produce such remarkable sedative effects on the nervous system. Attention was first directed to the bromides—as every one knows—by their action on the reproductive system; but a wider study and fuller experience in their use show us that they have the same action on the entire nervous system—from head to foot, on the general and special functions,—the brain is bromized, the spine is bromized, and all the nerves that proceed from them are bromized; there is no evidence of any selective or partial action of these remedies on any organ, or any limited area of the body; the molecular movements that are correlated to the evolution and transmission of nerve force are lowered by this drug. Just as magnets have their magnetic power reduced by heat, just as metals when heated also become poorer conductors of electricity, just so the nerves when bromized become poorer transmitters of nerve force, and of any other irritation from outside. This I take to be the philosophy of the fact that the bromides are the most popular remedies in the entire pharmacopœia, in all nervous

diseases among nervous Americans—the class of all others who most need to have their nervous activity lowered instead of increased. This I take to be the philosophy of the fact that bromization is to sea-sickness what vaccination is to small-pox; preventing it almost absolutely, when it is thoroughly done and properly repeated. The study of sea-sickness, I may add, has been of great service in the study of bromization and its antidotes; but as long ago as the first edition of my work on “Sea-sickness,” I spoke in detail of these unpleasant effects of bromization.

Fourthly. The bromides, if used long or frequently on any patient, should be used in alternation or combination with tonics of some kind. In epilepsy this has been understood for some time, but it has not been understood that in the functional nerve diseases the same principle applies. Last year, in our discussion of this subject, it was denied that benefit could come from combining bromides and tonics. This injunction I regard as of very great importance. My own custom is to give bromides one week, and tonics the next, or to give the tonics during the day and bromides at night. Sometimes I include a tonic, as *nux vomica*, in the bromide prescription, and also *ingluvin* and *arsenic* in very small doses to act on the stomach. Bromization can be held, when once started, on land or sea, by simply one dose at night or every other night; meanwhile, before meals, tonics—as *strychnine* or *quinine*—can be given. I am fully persuaded we should not hear so much of the evil effects of bromides if these customs were pursued among physicians. There is no inconsistency in using a sedative and a tonic at the same time; and Dr. Gray, in his paper on this subject last year, was, so far as I understood him, right and verifiable all through. My claim is, then, on this point, of a two-fold character: first, that we get better therapeutic effects by combining or alternating bromides and

tonics; and, secondly, that we avoid the evil effects, that are almost sure to come, by following this plan. Even in epilepsy I adopt this plan with satisfaction. The bromides, used in the method I have described, make it possible to give the nervous system a vacation, which, perhaps, it may not have had before for years; a rest far superior to the rest in bed, even with all the adjuncts of electricity and massage; but if this vacation be continued, unbroken by tonics, the effect is the same as in keeping the muscles long disused; there is a long debility from which it may be hard to recover; and thus may come those effects which are constant advertisements of the evil effects of doctoring.

One of the best remedies to use against bromization—that is, to cut it short when it is going on to unpleasant symptoms—is powdered citrate of caffeine, in doses of three to five grains. I provide those who go to sea with this, to be used in case of bromization that may have been carried too far. This is not, I believe, generally known. In the hands of a physician strychnine is one of the best antidotes to bromization; but quinine is safer for the patient's home use. Dr. McBride tells me that he has used strychnine hypodermically for this purpose with satisfaction.

Fifthly. It is an advantage to use a number of the bromides in combination.

The following bromides are those which are most familiar, and which I use in combination:

Bromide of potassium, which contains 68 per cent. of bromine.

Bromide of calcium, which contains 80 per cent. of bromine.

Bromide of sodium, which contains 80 per cent. of bromine.

Bromide of ammonium, which contains 81 per cent. of bromine.

Bromide of lithium, which contains 92 per cent. of bromine.

To these may be added bromide of manganese, which contains 75 per cent. of bromine. I had some bromide of manganese manufactured for me by Messrs. Caswell, Hazard & Co., of this city, and used it for a time. I suggested its use on the theory suggested by Prof. Haines, of Chicago, that manganese might be somewhat of a tonic; whereas, the calcium and sodium and potassium and ammonium and lithium have a somewhat debilitating effect, when used in excess. I find, however, two objections to bromide of manganese: first, it causes a headache, even in quite small doses of a few grains. Secondly, its taste is somewhat bitter, so that, when added to a bromide combination, it gives a bitter taste to the whole, which is more or less unpleasant. I have not been able to satisfy myself, therefore, that it has, practically, any advantage over the other bromides of the class to which it belongs. All the other bromides I use in combination, and, as it seems to me, with advantage; that is, we seem to get better effects in some cases from this combination than from any one used alone. I admit that it is very difficult to prove this; I cannot prove it to any one who denies it or doubts it. But I form this judgment from observation of many persons who have used one of the bromides alone, and have not obtained the effects which they have from very much the same dose of this combination.

It will be observed that the bromide of potassium contains a smaller quantity of bromine than any other of the bromides; and this is the one that is most used; whereas, the bromide of sodium contains 80 per cent., ammonium 81, while lithium has the largest proportion of all, 92 per cent.

For sensitive, delicate stomachs, and for sea-sickness, generally, bromide of sodium has these advantages, namely: that it is easier on the stomach, less irritating, and its taste is less disagreeable than the other bromides, and certainly less disagreeable than the bromide of potassium.

I always give these bromides largely diluted with water, one or two tumblers full, if the patient will take them. This dilution has a double advantage; first, it prevents the local irritating effect of the salt on the stomach; and, secondly, it helps to flush the system with water, a very desirable thing in very many of our nervous patients, who have, as one of the symptoms of their nervousness, thirstlessness, or lack of desire for fluids, and difficulty in receiving and assimilating them. For these same reasons, I like to give all, or many, of my remedies freely diluted.

In regard to the other bromides,—bromide of camphor, bromohydric acid, bromide of quinine, bromide of zinc, and bromide of iron,—I may say that I use all of them, more or less, and like them all. In treating persons who have been injured by the ordinary bromides, or who think they have, or who have taken them too long, or who are in danger of taking them too long, I find it an advantage—not only in epilepsy, but in epileptoidal states and neurasthenic states—to make a change in the form of bromide used, to substitute the bromide of zinc, a favorite remedy with me, either alone or in combination with other zincs, or with *nux vomica*, or the bromide of camphor, or bromohydric acid, in some cases, in pretty large doses. I have not made much use of the bromide of quinine, or the bromide of iron, for the reason given above, namely, that I use tonics in connection with the bromides, and so do not need these preparations. So far as I can see, large doses of many of the chief bromides will prevent unpleasant action of quinine on the head, nearly as well

as the bromohydric acid, of which so much has been written. If, for example, a patient takes a large dose—say 60 grains—at night, or every other night, and takes quinine during the day, he will not be near as likely to have the unpleasant head symptoms of quinine, as he would be, were the bromide not taken. I have seen some cases where the bromide of camphor, in small doses, had a very delightful action, and have seen many others where large doses could be taken without getting very much effect.

Sixthly. Some nervous patients who are not epileptic or even epileptoidal yet need to use the bromides frequently if not regularly, for a time, just as though they had epilepsy.

The bromides are to be used in such cases subject to the precautions above given.

There is such a thing as the habit of taking bromides.

The bromides are not narcotics, and there is not, usually, any great danger of acquiring the habit of taking them, as the habit of taking alcohol or opium is acquired. They, however, who get pleasant effects from them may take them too frequently, or too much of them, as they take too much of quinine, or may take them when it is not necessary, when they could just as well do without them. But the effect in these cases is not like that of chloral, or opium, or alcohol. There does not appear to be, in any cases that I have seen, that craving for the remedy, and certainly not an irresistible craving. It cannot be, however, too often repeated, or too widely known, that the bromides are sedatives rather than tonics, and that, over-used, they tend to depress rather than to strengthen; and that nervous persons, whatever special variety the nervousness may assume, who depend habitually upon taking the bromides, will be in time injured thereby, and will be likely to reach a point where they may be seriously harmed. *The*

great secret of taking the bromides, just as in taking other remedies of power, is to know just when to stop taking them. And there is no arithmetical rule to guide us. Each case is its own study. I am, however, convinced that there are quite a number of persons who are not exactly epileptic, and who do not have even epileptoid or epileptiform symptoms, but who may be said to be half way between neurasthenia and epilepsy, who need to be treated persistently, at intervals at least, with bromides, very much as epileptics must be treated, and with whom it will not answer to let up permanently, or for a very long time. The tonics, however, should be used in alternation or combination. In all such cases the effort must be to wean the patient from the bromides as soon as possible. This can be done not only by the use of tonics, but by the use of other sedatives, as hyoscyamus, hyoscyamia, scutellaria, conium electricity, and warm baths.

Considerable has been said, here and there, of the relation of the bromides to hyperæmias and anæmias. It has been said that they are good, when there is an excess of blood in the nerve centres, and bad, when there is a deficiency in the nerve centres. My own views in regard to this whole subject of congestions and anæmias of the brain and nervous system have been expressed so often, in my writings on neurasthenia¹ and elsewhere, that there is no occasion to repeat them here. It is sufficient to say that I look upon the nervous system as the primary factor in the philosophy of functional nervous diseases, of which neurasthenia is a type, and that disturbances in circulation are secondary. In other words, innervation precedes circulation, and attacks of local passive congestion in all parts of the body are frequent results.

I have no doubt that these attacks of passive congestion

¹ Neurasthenia (Nervous Exhaustion): Its nature, symptoms, and treatment. American Nervousness: Its causes and consequences.

may take place even in persons who are very anæmic generally, and in whose bodies there is too little blood, or the blood is unevenly distributed; too much in the nerve centres and too little in the limbs. The bromides, by their action on the nerves, relieve these passive congestions; and this is one factor in explaining their action.

Hence is explained the fact, that even in general anæmia the bromides may be used, for a short time at least, with all the good effects that are obtained in hyperæmia.

One practical inference from the above analysis is clear, namely, that the bromides are not to be tossed off carelessly as a prescription to be taken any time, and for any time, and by any body; but are to be watched over at the outset of their use especially; and the physician should, if possible, have his hand on the helm all through the voyage. In all cases where it is practicable, I insist on seeing my patients or hearing from them when they take bromides.

A CASE OF ACUTE CHOREA.

By FRANCIS P. KINNICUTT,

PHYSICIAN TO ST. LUKE'S HOSPITAL, NEW YORK.

THE following case, which has recently been under my care, in my service at St. Luke's Hospital, presents sufficiently interesting features to be worthy of record.

Herman Lutz, æt. 14, was admitted to the hospital on May 21st. Family history excellent. The patient has never had rheumatism ; has enjoyed exceptionally good health during his life until six weeks ago, when he had a well-marked attack of intermittent fever, of the quotidian type. The paroxysms only finally ceased toward the end of the third week from the beginning of his illness. With their cessation the patient first noticed slight involuntary movements of his right foot ; gradually his right hand, the upper and lower extremities of the left side, became similarly affected. The patient was, however, able to feed himself and perform other voluntary acts until five days before admission, when the choreic movements became general and of such violence that all voluntary movements were rendered impossible. The disorderly muscular action continued to increase in intensity up to the time of admission to the hospital.

On admission, May 21st, the expression of the patient's face was one of extreme distress; the choreic movements were of great violence, involving every visible voluntary muscle ; articulation was abolished ; the urine and fæces were passed in the bed, apparently from the inability of the patient to make his wants known ; temp. in axilla, $104\frac{3}{8}^{\circ}$; pulse, 120, regular. Conversation addressed to him was evidently in a measure understood. A physical examination of the chest was made with much difficulty, on account of

the constant and extremely violent jactitations of the whole body; a loud systolic murmur at the point of impulse of the heart was detected, the true nature of which was a matter of doubt, on account of the impossibility of a thorough examination. Further examination failed to reveal the existence of any visceral affection in explanation of the high temperature. Mattresses were placed on the floor of an alcove, with others against the walls, and within this enclosure the patient was confined with suitable attendants. Nourishment was given with much difficulty, two nurses restraining by force the contortions of the body, while a third introduced the fluid into the mouth.

May 22d. The patient obtained four hours' sleep at different intervals during the night, under the influence of 3j of the bromide of sodium combined with 3ss of chloral hydrate.

During sleep the choreic movements ceased. The patient's condition shows no improvement. Temp. (axilla), $104\frac{3}{8}^{\circ}$; pulse, 128, regular. Exm. of urine shows the absence of albumen, sugar, casts. Ord. Fowler's sol. in ℥vi doses *t. i. d.*, to be rapidly pushed to the point of tolerance.

May 23d. Patient slept in all four hours during the night, under the influence of 3iss of the bromide of sodium and 3ss of chloral hydrate. His condition remains unchanged; the choreic movements are ceaseless and of great violence. Is taking ℥vii of Fowler's sol. *t. i. d.* Ord. hyoscyamia gr. $\frac{1}{8}$ (Merck's crystalline preparation) by the mouth, to be repeated in six hours.

May 24th. Pt. had only one hour's sleep during the night. The house physician reports that the muscular disturbance increased so markedly that he did not venture to repeat the dose of hyoscyamia, but substituted the chloral and bromide mixture. Temp. (axilla), 104° ; pulse, 104, regular; resps., 36. The patient has been able during the past 24 hours to make his wants known by signs sufficiently to avoid soiling the bed. Ord. a cold pack, which had little or no effect in even temporarily reducing the temperature.

May 25th. Patient's condition worse, the choreic movements, if possible, more violent than at any previous time. Temp. (axilla), $105\frac{1}{8}^{\circ}$; pulse, 134, regular. Is taking ℥x of Fowler's sol. *t. i. d.* Ord. the bromide of sodium to be discontinued; gr. xxx of chloral hydrate to be given at intervals of two hours, until sleep produced.

May 26th. Patient obtained six and a half hours of quiet sleep after the administration of ℥iv of chloral. There is a decided

improvement in his condition in every respect ; the intensity of the muscular disturbance has markedly diminished, imperfect articulation is possible. Temperature (axilla), $101\frac{4}{5}^{\circ}$. Pulse, 100, regular. Is taking ℥xii of Fowler's solution *t. i. d.*

May 27th. Continued improvement. Temperature, $101\frac{2}{5}^{\circ}$; pulse, 114, regular. From this date, for several days, iv-vi scruples of chloral hydrate were given daily, with the effect of producing from six to nine hours of quiet sleep in the twenty-four hours ; there was accompanying continuous and rapid improvement in the patient's condition. *Pari passu* with the subsidence of the muscular contractions, the temperature fell, until, on June 1st, comparatively slight choreic movements being present, the thermometer in the axilla registered $98\frac{4}{5}^{\circ}$

During the past week the chloral has been gradually reduced in amount, until at the present time only a single dose of grs. xv is administered at night. Twelve minims of Fowler's solution are still given *t. i. d.*

On examination of the patient on June 16th, the following notes were taken : Patient anæmic, marked dryness, with slight general furfuraceous desquamation of the skin ; no œdema ; no gastric disturbance. Examination of the urine shows an absence of albumen, sugar, casts. The articulation is perfect, the patient cheerful and intelligent for his age. There was an entire absence of choreic movements during the time consumed in the examination. Examination of the heart reveals a very faint systolic murmur at the apex, which is confined to this situation. Area of dullness normal.

Remarks.—The points of especial interest in the case which has been recorded are : (a) the high temperatures, which form a curve coinciding very exactly with each rise and fall in the intensity of the muscular disturbance ; (b) the immediate and rapid improvement following the administration of very large doses of chloral ; (c) the influence of the affection in producing a functional mitral murmur.

A correct explanation of the high temperatures observed is, perhaps, impossible. Ordinary chorea is a feverless affection, yet the occurrence of marked pyrexia in the graver forms (we do not refer to the disease known as true chorea

major or Germanorum, which would seem to be an essentially different affection) is mentioned by numerous authorities.

In the present case the influence of a malarial factor in the production of the pyrexia may be doubted, in view of the very irregular temperature curve and the course of the disease. The presence of a visceral lesion, acting as a cause, would seem improbable from the complete absence of physical signs. We are therefore compelled to regard the marked rise in temperature as dependent either upon the ceaseless and very violent muscular contractions, or upon an unknown lesion of the nervous system, exciting at once the choreic movements and the pyrexia.

The effect of large doses of chloral in controlling the acute form of the disease would seem to be demonstrated in the present instance. The improvement following its administration in large doses was immediate and most marked. Similar results have been recorded by Gaidner, Bouchut, Frerichs, Verdalle, and others.

The method pursued in the above case, and which was shown to be the most efficient, consisted in the administration of the first dose toward evening, repeating it at intervals of two hours until sleep was produced. In this way a number of hours of continuous quiet rest was procured, from which the patient awoke invariably refreshed and quieter. The influence of the arsenic in controlling the symptoms may be doubted, inasmuch as extended clinical experience has shown that its effect in chorea is only slowly obtained.

The pathogenesis of the functional disturbance of the mitral valve is as obscure as in cases of anæmia, chlorosis, etc. An affection of the papillary muscles has been theoretically suggested in explanation of the phenomenon, and, *a priori*, would seem more probable in chorea than in other affections.

A SECOND CONTRIBUTION TO THE STUDY OF LOCALIZED CEREBRAL LESIONS.*

By E. C. SEGUIN, M. D.

I N 1877 I reported to the American Neurological Association¹ a number of cases with accurate *post-mortem* examinations, illustrating the doctrine of localization of functions in the brain. Since that time I have made several similar observations, some of which have been published as isolated cases. In the past year two remarkable cases of cerebral tumor bearing upon the Ferrier hypothesis have been added to my records, and I think that the time has come to offer a second instalment of facts in this department of medicine to the medical public. I shall first relate my last unpublished cases, and point out their significance, then reproduce in brief the isolated observations, positive and negative, which I have separately published.

I would only claim, in offering this second paper, to be adding a few data, trustworthy data, I believe, to a mass of observations which tend to support the theory of cerebral localization. This theory or hypothesis can be established as true only by great numbers of pathological facts corroborating the results of experimental physiology and of anatomy.

* Read by title at the seventh annual meeting of the American Neurological Association, June 17, 1881.

¹ Contribution to the study of localized cerebral lesions. *Transactions of the American Neurological Association*, vol. ii, 1877.

CASE 1.—Mrs. I. D., aged 58 years, seen Oct. 3d, 1880.

A strong, intellectual woman, who has enjoyed good health. In early spring was overworked and anxious about the outfit of a daughter who was to be married.

In May began to have a peculiar general headache (different from any she had had before), most marked in the occipital region, and always worst at night. She often complained of a sore, stiff feeling in the neck on rising in the morning. At times, in connection with headache, has had nausea and vomiting. This headache has been a prominent symptom ever since, amounting at times to agony.

Later in the month of May, or in the early part of June, there was noticed a trembling of the left hand; this increased, and was accompanied by evident loss of power. Relatives of the patient describe two sorts of movements of the left arm: first, a slight and nearly constant fine tremor; and, second, attacks of considerable jerking, so that the patient was obliged to hold the affected left hand with the right. Each day there were several such attacks, some lasting an hour.

Has grown steadily worse; more headache, marked paresis of the left arm, with some contracture, slight weakness of the left leg. Sight not so good as formerly, but there has been no diplopia, hemiopia, etc.

Last night the pain was intense through the mastoid regions, and in the whole of the head. Was given $\frac{1}{2}$ grain sulphate of morphia occasionally, and by 10 A. M. to-day had taken $\frac{5}{8}$ grain; is semi-comatose, but still groaning from pain; the left hand and arm are semi-flexed and stiff.

Examination at 5 P. M. Patient is profoundly asleep, yet can be roused; respiration is slow and very irregular, but not of the Cheyne-Stokes type. When spoken to loudly, points (with right hand) to the sides of the head as the seat of chief pain; is able to swallow. The pupils are small and fixed, the right larger. The right internal rectus is weak. The left lower face is paretic. The left arm and hand are strongly adducted and semi-flexed on the thorax, and passive extension is difficult and painful. Legs extended, not stiff; both show good reflexes at the knees. Left hand and leg are less sensitive than the right. The pulse beats about 72 per minute, and is weak; the axillary temperature is 37.4° C. (99.3° F.). After the use of atropia, I was able to observe typical neuro-retinitis (choked disks) in both eyes; no hemorrhages. Urine contains a trace of albumen.

My diagnosis was tumor in the right cerebral hemisphere, complicated by morphia narcosis. I considered that very probably the tumor was in the median region of the hemisphere, in the so-called centres for the arm and leg, according to Ferrier's experiments and to recent *post-mortem* facts.

A great many notes were made during the progress of the case, but they only show the extraordinary variations in the state of the patient, which I, and others, have observed in cases of cerebral tumor. Some days Mrs. D. would be sitting up and very bright, and the next day might appear moribund.

On October 5th is up on a lounge, is bright and cheerful, though mind wanders at times; headache has returned about the vortex. Can converge eyes well. Exhibits common left hemiparesis, with contracture, most marked in arm and hand. Ordered solid food, and iodide of potassium.

Oct. 10th. Growing steadily worse. Attacks of pain in the head, at times very severe, controlled by morphia and chloral. The arm is now completely paralyzed, with painful contracture of elbow and shoulder. No voluntary motion in left arm for forty-eight hours; the left leg, which four days ago could be drawn up fairly well, is now nearly motionless. Left face is paretic, but tongue points straight. Answers questions, but wanders; wants to be dressed, to go out, etc. Wets the bed. Optic nerves choked as before.

Oct. 13th. State of paralyzed limbs has varied from partial to complete paralysis. Extreme sensibility to narcotics.

Oct. 15th. Sulphate of quinia produced delirium the other evening, and she is easily plunged into dangerous narcosis by morphia. Morphia .002 + and chloral .15 have *some* effect.

[On Oct. 9 it is noted that left arm is completely relaxed and the tongue is straight.]

Nov. 1st. Divergent strabismus and slight drooping of right upper lid. Speech very indistinct. Left hemiplegia as above. Delirious and semi-comatose at different times. Incontinence of urine and fæces.

Nov. 4th. Greater coma and first appearance of fever. 7.30 A.M.: Pulse, 162; respiration, 52. At 4.30 P.M., pulse, 136; axillary temperature, 39.2° C. (102.5° F.); breathing, moribund *i. e.*, inspiration and expiration equal. Left arm in semi-flexion on chest, elbow and wrist limber, fingers slightly but decidedly contracted. At 10 P.M., respiration, 56; pulse, 160; axillary temperature (six minutes), 39.8° C. (103.75° F.). Right eye is in slight external

strabismus and motionless ; the left is in continual lateral motion ; pupils medium-sized, equal.

Nov. 5th, 1 A.M. Respiration, 56 ; pulse, 176 ; axillary temperature, 40.15° C. (104.25° F.) ; jaws firmly closed. Death occurred before daylight, and the temperature finally rose to 40.6° C. (105° F.).

No *post-mortem* measurements could be made.

The autopsy was made about ten hours after death by Dr. R. W. Amidon under my direction. Drs. W. R. Birdsall and C. Adam were also present.



FIG. I.

Lateral view of the right cerebral hemisphere, after Ecker. Shaded spot represents the location of the tumor. Superficially it involved only the ascending frontal gyrus.

Very little blood escaped on removing the calvarium. The pia mater was found excessively dry and sticky and without gloss. There was a marked prominence of the right parietal portion of the brain, causing the whole hemisphere

to appear much larger than the left. The convolutions about the upper end of the fissure of Rolando on the right side were very much flattened.

A vertical transverse section passing through the middle of the motor zone revealed a consistent, grayish-red

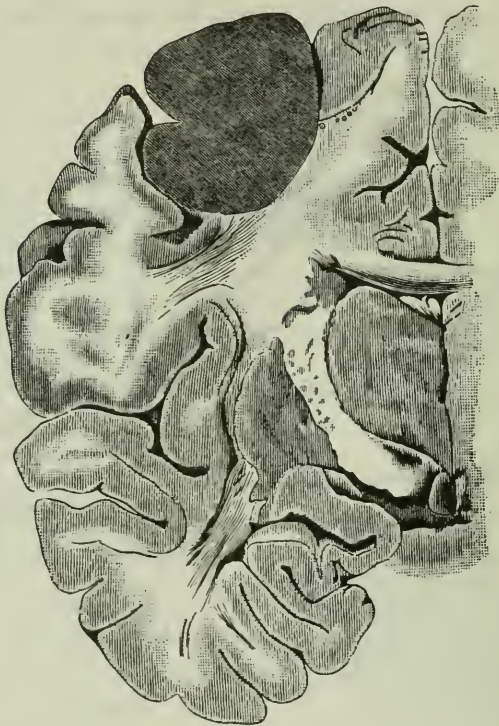


FIG. 2.

Transverse vertical section through the right hemisphere, anterior view; after photo. No. 5 of Bitot. The gray shaded mass in the upper part of the figure represents the tumor.

tumor lying chiefly in the right ascending frontal convolution, wholly under the pia, and in the angle formed by the ascending frontal convolution and the paracentral lobule at the top of the brain. See fig. 1.

The tumor was about the size of a small English walnut,

well defined from the brain substance, vascular, and at points almost gelatinous in structure.

The right third nerve was grayish. Right eye removed, showed an elevated papilla.

The brain and eye were placed in bichromate of potassium solution for hardening.

The following is a study of the topography of the lesion made upon the hardened specimens :

The tumor, ovoid in shape, lies in the upper part of the ascending frontal convolution and in its subjacent white matter. It measures upon the vertical transverse section of the brain, transversely, 15 mm. at its pia mater attachment, 20 mm. in its middle, and, vertically, from its deepest point to the pia 28 mm. See fig. 2.

It extended well across the bottom of the fissure of Rolando, so as to slightly impinge upon the ascending parietal gyrus. The distance from the surface of the brain in the longitudinal fissure to the internal edge of the tumor is 25 mm., thus leaving the paracentral lobule and its attached white matter intact.

The tumor is spongy in texture, well defined from the surrounding cerebral substance, and seems firmly united to the pia. The microscope shows it to be an alveolar carcinoma.

It probably caused a great deal of pressure in spite of its small size.

CASE 2—L. K., an upholsterer, aged 34 years, came to the Manhattan Eye and Ear Hospital, department for nervous diseases, Oct. 6, 1879. He was a strong and healthy-looking German. The following is a transcript of my notes :

Has had attacks of right-sided epilepsy. First seizure was about two years ago (1877), and the attacks have occurred at the rate of one every four or six weeks. In the last few months has had attacks every week, and even several times a week. The phenomena have always been the same in these numerous attacks ;

the spasms being wholly restricted to the right arm and leg ; the slightest attacks are only momentary shocks on the right side of the body—no spasm in the face. Even in the severe attacks the spasm is wholly clonic, and he never loses consciousness. An exception to this occurred on August 5, 1879, when he had a severe seizure with loss of consciousness.

The attacks last from a few seconds to a few minutes ; they are preceded by a sensation of something rising from below upward to the throat, and there causing choking. He never foams at the mouth, or bites tongue, or micturates in attacks, and during them he is often able to speak a few words in a jerky manner.

In intervals between attacks has good use of his right hand and leg ; he is now working at his trade. Mind clear and calm.

Very lately has noticed a slight weakness in the right limbs, and the right leg has been the seat of an indefinite numbness. Complains of diffused headache, mostly frontal. No vertigo or petimal.

Denies injury to head and any venereal disease.

Examination.—Manner, appearance, and speech normal. No facial palsy ; tongue straight ; pupils equal. Right hand grasps 45° and 48° , and the left 45° and 45° on Mathieu's dynamometer. No anæsthesia to careful testings. Patellar tendon reflex absent on the left side, and strong on the right (never sharp pains in legs). The walk is rather of hemiplegic type on the right side ; the right foot is held slightly in equino-varus position. Complains of sight of right eye, and states that when a soldier he was obliged to aim with the left eye. Examination of eyes by Dr. J. O. Tansley shows myopia of right eye, but optic nerves normal.

The diagnosis was a cortical lesion (tumor?) in the left hemisphere, involving the upper part of the motor area.

The following mixture was ordered: \mathcal{R} . potassii iodidi, 15.; potassii bromidi, 30.; aquæ, 200.; S.: one teaspoonful before each meal, and two at bedtime, in plenty of water.

Oct. 10th. No spasm since beginning of the treatment, but the paralytic phenomena have increased ; the walk is distinctly hemiplegic on the right side. Still works. Ordered to continue treatment, with addition of 4. ext. ergotæ fld. with the evening dose of bromide.

Oct. 13th. No attack. Speech normal ; tongue deviates slightly to the right.

Oct. 17th. Slight spasm in the arm (right) yesterday ; increasing paresis. Right hand squeezes 44° and 45° ; the left, 50° and

45°. Ordered only three teaspoonfuls of bromide mixture at bedtime. To take besides 20 drops of a saturated solution of iodide of potassium three times a day in water.

Nov. 10th. No spasm; paresis of right leg more marked; walk distinctly hemiplegic.

Nov. 20th. Dr. Amidon was summoned to see the patient at his house. Has violent headache, more to the left of the median line at the vertex; photophobia, nausea, and almost constant vomiting. There is complete paralysis of the right arm and leg, and these parts are œdematous. Partial relief by hypodermic injection of .02 sulphate of morphia thrice during the day.

Nov. 22d. The pain has continued intense. Has asked to be killed. No aphasia. Eyes, examined by ophthalmoscope, show myopia $\frac{1}{16}$ in each eye; fundus normal; sleep induced by hypodermic injection of chloral.

Nov. 30th. Headache has continued intense, requiring chloral and morphia. Has also had bromide and iodide of potassium as above. Some motion in fingers and right foot (lost on 31st).

Nov. 14th. Less headache, but continued right hemiplegia. Bed-sore beginning over sacrum. Some hesitancy of speech. At no time any aphasic defect.

Nov. 19th. Eyes again examined (without atropine); right fundus well seen, and found normal.

Nov. 21st. First signs of paresis in face; right cheek looks weak, and tongue points a little to the right side. Still has very severe headache.

Nov. 30th. Involuntary escape of urine. Scarcely able to speak from difficulty of articulation. At times silly.

Dec. 4th. Cannot be understood. Some contracture at right elbow, and the muscles of right arm and leg show some atrophy.

Dec. 19th. Paralysis now very marked about right cheek.

Dec. 31st. Quite a large bed-sore has formed on the right side of the sacrum. Marked atrophy of right arm and leg; elbow very stiff. Is semi-comatose. Pupils moderately small. Understands what is said to him, and tries to protrude his tongue when asked. Profuse sweating.

Jan. 2, 1880. Much brighter; speech can be understood. Of late has had no treatment except chloral occasionally.

Jan. 4th. Beginning of terminal stage. Fever and rapid respiration. A.M., axilla temperature, 38.8° C. (101.80° F.). At 5 P.M., asleep and sweating profusely. Pulse, 126; respiration, 26;

temperature, 39.2° C. (102.5° F.) in axilla ; in the rectum the thermometer indicates 40.1° C. (104.12° F.).

Jan. 5th. Fever and rapid respiration all night. At 11 A.M., pulse, 126 ; respiration, 56 (shallow) ; rectal temperature, 41.25° C. (106.2° F.). At 2 P.M., comatose without stertor ; skin moist. Eyes in conjugate deviation to the right side ; head straight. Pulse, 145 ; respiration, 50 ; rectal temperature, 41.6° C. (106.8° F.). At 4 P.M., died.

The autopsy was made by Drs. R. W. Amidon and W. R. Birdsall 24 hours after death. The calvarium was found very thin ; translucent in spots. Dura mater normal. No subarachnoid fluid. There were many large superficial cerebral veins. The left motor area gave a sense of fluctuation ; the convolutions of this part seemed normal, but were flat. On attempting to remove the falx cerebri in the usual manner, it was found adherent to the inner surface of the left hemisphere, pretty well back toward the tentorium. The cortex was ruptured in this location, and a gelatinous, bloody mass escaped. The rest of the encephalon seemed normal to external inspection.

A vertical transverse section was made through both hemispheres in the motor area, passing through the ascending frontal gyri. Occupying the centrum ovale underneath the left cortical motor area, and completely undermining it was a large cavity capable of holding 100 cc. (?), very much resembling a distended lateral ventricle, which contained a large amount of coffee-red serum, and also a mass (tumor) lying on its inner side, near the paracentral lobule. The tumor was gelatinous and grayish-red. The walls of the sac were vascular and grayish, and appeared covered by an ependyma-like membrane, which, under the microscope, was found to consist of capillaries and portions of blood pigment.

The tumor itself had formed a connection with the falx cerebri posteriorly, in the region of the paracentral lobule,

and this region of the cortex was thinned; it bulged across the median line and indented the opposite hemisphere.

On the left side the corpus callosum was pressed downward, and the optic thalamus was also depressed and flattened. The left lateral ventricle was displaced downward and closed by pressure; on opening it, it was found free from disease. These appearances were sketched from the fresh surface of section by Dr. Amidon, and are shown in fig. 3.

Sections made through the hardened brain confirmed the above notions of the seat of the tumor. It lay wholly be-

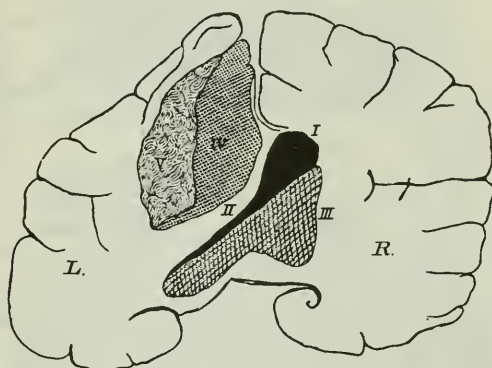


FIG. 3.

Transverse vertical section of the brain, Case 2, viewed from behind. *R*, normal right hemisphere; *L*, diseased left hemisphere; *I*, distorted lateral ventricles; *II*, depressed corpus callosum; *III*, thalami optici, depressed on left side; *IV*, the tumor; *V*, the cavity formed by the hemorrhage.

neath the externally visible convolutions of the left hemisphere, springing from and destroying that part of the first frontal gyrus which lies within the longitudinal fissure, above the corpus callosum and the paracentral lobule, forcing downward the gyrus fornicatus, extending outward into the white substance of the hemisphere, causing great compression of the surrounding parts, including the upper extremities of the first and second frontal gyri, the upper half of the ascending frontal and parietal gyri, and, to a less extent, of the upper parietal lobule.

A part of this pressure was due to the cyst lying outside of the tumor, near the convexity convolutions, which is more especially shown in the sketch made by Dr. Amidon from the fresh specimens.

The situation and dimensions of the lesion in this second case were therefore very different from those in the first case. In Case 2 the destructive effects of the tumor were expended upon the gray and white substances lying next

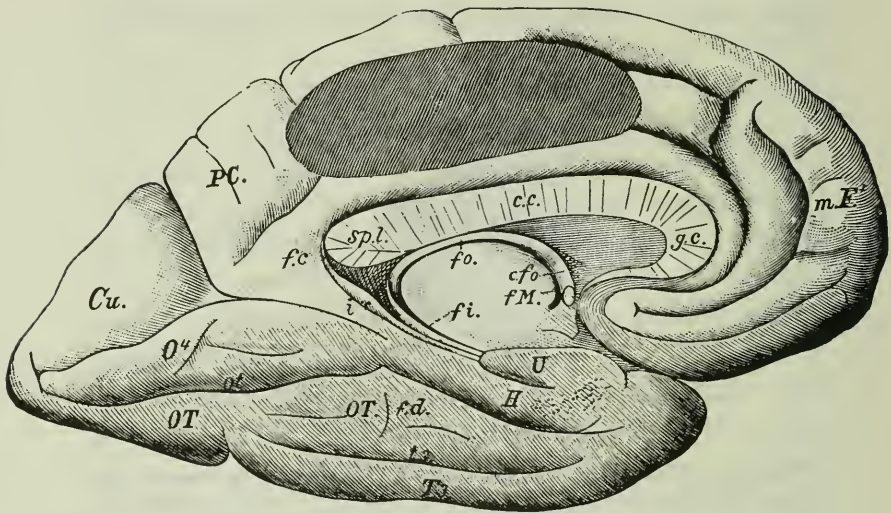


FIG. 4.

View of inner surface of the left hemisphere, after Schwalbe. Shaded spot indicates the superficial location of the tumor.

the longitudinal fissure, and the rest of the hemisphere suffered only compression effects. The posterior extremity of the intra-fissural part of the first frontal convolution and the paracentral lobule suffered the most destructive effects.

The tumor and cyst were of very irregular shape and I can only give approximate measurements. In the longitudinal fissure and near it in the brain the tumor was about 60 mm. in length (antero-posterior dimension); on a verti-

cal transverse section of the hemisphere, as in fig. 5, it measured 30 mm. transversely, and from 30 to 35 mm. vertically. These figures include the cyst, which was more developed in the frontal lobe, extending forward as far as the posterior part of the second frontal gyrus (wholly under it). The other (posterior) extremity of the lesion, the

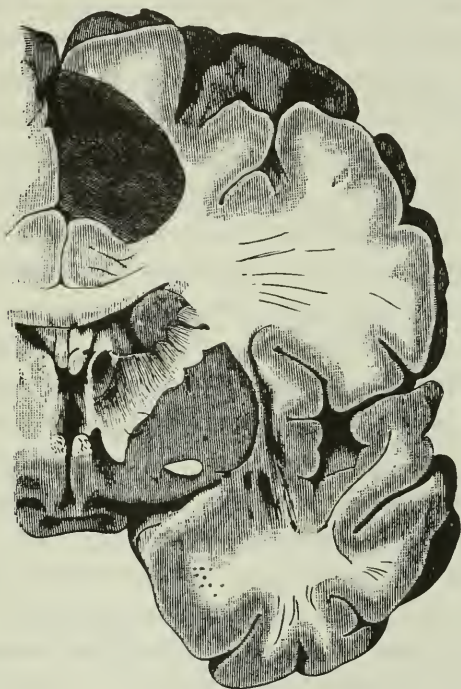


FIG. 5.

Transverse vertical section of left hemisphere, anterior view; after photo. No. 4 of Bitot. Shaded spot in upper part of drawing shows the location of the solid tumor.

solid growth, could be traced, on the median surface of the hemisphere, well into the surface of the precuneus.

A microscopical examination of the tumor showed it to be a common small-celled sarcoma.

Remarks.—There are many interesting features in the

semeiology of these two cases, but I shall dwell only upon those symptoms which are concerned in the questions of cerebral localization.

In both cases the first motor symptoms were epileptiform, and in Case 2 the spasm was the first and only symptom for many months. In Case 1 it was preceded by severe pain in the occipital region. In Case 1 attacks of jerking of the left arm, as well as trembling of that member, were observed by the patient some weeks before the weakness became apparent. There was no jerking of the cheek or leg. It was a brachial monospasm. It is remarkable and most instructive to note how quickly paresis and paralysis followed, these phenomena being for a long time limited to the arm; a brachial monoplegia succeeding the brachial monospasm. Contracture of the arm and hand also showed itself, but at what time is not definitely stated.

Late in the disease, when she came under observation, the left lower face and left third nerve were somewhat parietic, the sensibility was somewhat impaired on the left side of the body.

If it be permissible to formulate the chief symptoms observed during life in correlation with the lesion found *post mortem*, then this (Case 1) was a remarkable instance of irritating and destructive lesion of the upper part of the right ascending frontal gyrus, causing brachial monospasm and brachial monoplegia on the left side (with other phenomena of secondary logical value).

In Case 2 the course of the motor phenomena was quite different. There was a period of two years previous to the patient being seen by me, in which the only symptom was right hemi-epilepsy. That is to say, from time to time clonic epileptoid spasms occurred in the right arm and leg for a few moments. The face was never affected, the patient could usually talk in the paroxysm, and he only once

lost his consciousness. He was unable to say whether the spasm appeared first in the arm or in the leg.

At the time when the patient presented himself at the hospital the paralytic phenomena were just developing. He was still working all day at his trade, and was not conscious of the partial hemiplegia. This was, and remained until the apoplectic attack, more marked in the lower than in the upper extremity. At the time of first examination the right hand (affected side) was still stronger than the left hand, but the walk was slightly hemiplegic, the right foot being held in a slight equino-varus position. There was then no facial paresis and no aphasia.

Later the epileptiform attacks were controlled by bromide of potassium, but the hemiplegia progressed, still greater paresis being noted in the lower extremity.

About six weeks after first calling at the hospital, the patient was stricken down by an apoplectic attack, which rendered the right hemiplegia complete in the arm and leg, with marked paresis of cheek, but never aphasia. This attack obscured the symptoms which we may reasonably assume had been caused by the tumor. At no time was there marked anæsthesia on the paralyzed side.

Headache was remarkably slight prior to the occurrence of the apoplectic attack.

The *post-mortem* findings explain all these symptoms very well I think. The cyst outside of the tumor proper, found in the white substance of the hemisphere, was the remains of a hemorrhage which took place at the moment of the apoplectic attack, which was characterized by intense pain in the head, vomiting, collapse, and complete right hemiplegia. Dr. Amidon states that in removing the brain a small laceration occurred, and "a gelatinous bloody mass escaped," probably the contents of the cyst, about seven weeks old.

The long stage of hemi-epilepsy without paresis, two years, is accounted for by the fact that the morbid growth began upon the median surface of the hemisphere, springing from the pia covering the inner winding of the first frontal gyrus, and perhaps the paracentral lobule ; at any rate, for a long time it was an *irritating lesion* causing discharges, and only gradually exercised enough pressure to *destroy* the irritability of the neighboring gyri. The parts of the hemisphere which must have suffered first in a *destructive* manner were the paracentral lobule and adjacent parts (posterior extremity of first frontal gyrus on median surface), and in connection with this should be noted the fact that paresis of the leg preceded and preponderated over that of the arm, until the apoplectic attack occurred. The absence of aphasia throughout, and of facial paresis previous to the hemorrhage, are likewise of interest.

If I may venture to formulate this case, I should define it as one of *irritating and destructive* lesion of the left paracentral lobule (and adjacent parts), causing crural and brachial monospasm and monoplegia, with greater development of symptoms in the leg.

It will be seen by a reference to the now numerous recorded cases of localized cerebral lesions that the two cases which I report are in sufficient harmony with the results reached, by many observers, thus far, viz., that the "centres" for the hand and arm are in or about the ascending frontal gyrus in its middle region, while the "centres" for movements of the lower extremity are further backward in the posterior extremity of the ascending frontal and ascending parietal gyrus, and their prolongation upon the median surface of the hemisphere, known as the paracentral lobule.

The many other interesting features of these two cases of cerebral tumor, I purpose considering in a future article upon the semeiology of cerebral tumors in general.

Before closing this contribution, it may perhaps be well if I present a brief *résumé* of the other cases of localized cerebral lesion which I have thoroughly studied (*i. e.*, while alive and *post mortem*) since the publication of my first paper on localization. Most of these cases have been published in medical journals.

CASE 3.—Hemiplegia with first symptoms in foot, and a limited cortical lesion.

In November, 1878, I saw, in consultation with Dr. Grannis of Saybrook, Ct., a gentleman aged 54 years, who was hemiplegic on the left side, and almost unconscious. The following account of his illness was furnished :

In December, 1877, after having enjoyed good health, he awoke one night with clonic convulsions of the left toes, foot and leg only. There was no impairment of consciousness, no spasm in any other part. He watched the spasm some time, and made comments on it. Since, there has gradually developed a left-sided hemiplegia. For months only the foot and leg were paretic ; in the last few weeks the left arm has become weak, and now the left cheek is paretic, though the relatives have not noticed it. In January, 1878, vision became impaired, but an examination by Dr. Noyes revealed no cause. In the last few weeks patient has seen double at times, and sight has gradually failed. Severe headache has existed from the first ; frontal, bilateral pain, most marked on the right side. The pain has been worst about daylight. In the past month pain decidedly nocturnal. On a number of occasions "lost himself" while out of doors, not remembering where he had been (*petit-mal*?). A business associate thinks that patient has committed errors in judgment. No extravagance in design or in deed. Lately has become stupid and semi-comatose.

Since January, 1878, a tumor-like swelling has appeared over the right parietal region. No albuminuria, but has had several attacks of gout. After severe cross-examination, patient admits having had a chancre fifteen years ago, treated with mercury ; denies secondary and tertiary symptoms.

Examination showed a typical left hemiplegia, face and limbs. No diplopia, pupils small and equal ; after atropia there is found a well-marked double neuro-retinitis. Sensibility preserved on the paralyzed side. Articulation indistinct, no aphasia. Stupor is peculiar, like that of drunken sleep. Patient can be roused by

loud talking and shaking, and then answers correctly (showing fair memory) and clearly. The swelling upon the head, raised perhaps half an inch, is just above the right parietal eminence, extending inward to the median line, and forward almost to the vertical line from the meatus auditorius to the bregma. This tumor overlies Ferrier's centres for the leg.

Diagnosis: External and internal nodes involving dura mater and the subjacent gyri of the right hemisphere.



FIG. 6.

Lateral view of right cerebral hemisphere, with lesion.

A few days later the patient died comatose, and after much trouble Dr. Granniss secured a partial autopsy. He was not allowed to raise the brain from the skull or to incise it. He simply removed the calvarium and noted the lesions at the vertex. He found that there was an internal as well as an external osteitis, forming quite a tumor which had, after adhering to the dura, exerted great pressure upon the subjacent convolutions of the right hemisphere. Dr. Granniss marked the location of the cortical lesion upon an Ecker's diagram, and the annexed wood-cut is a copy of his sketch.

It is of course very much to be regretted that a thorough examination of the brain was not permitted, but in view of numerous recent cases, it is impossible not to admit a causal relation between the lesion causing pressure upon the inner end of the right ascending frontal and parietal convolutions and the symptoms in the left foot and leg—spasm and paralysis.¹

¹ *Archives of Medicine*, vol. ii, p. 105. (A remarkable case of hemorrhage under the paracentral lobe, with paralysis of the opposite leg, is recorded by Dr. Miles, of Baltimore, in the same journal, p. 103.)

CASE 4.—Aphasia with word-deafness ; no permanent paralysis ; lesion in the parietal region.¹

The main facts of the last illness of the late Dr. C. M. A., of New York, are already well known to his numerous friends in the medical profession, who watched the progress of his disease with painful interest. Throughout his illness he was attended by his partner, Dr. A. Dubois, and myself. He was also seen in consultation by Profs. Austin Flint, Sr., John T. Metcalfe, H. D. Noyes, and Dr. Allan McLane Hamilton ; and for several months was under the professional care of Prof. E. C. Seguin.

Dr. A. was born in 1827, and was therefore fifty-two years of age at the time of his aphasic attack. At the age of eleven years he had a long illness, which was called "brain fever." Whatever may have been its real nature the illness was sufficiently severe to seriously endanger life, and for several years retarded his growth. At about the age of thirty years he had an attack of inflammatory rheumatism affecting the larger joints. This was followed by three or four other attacks within the next few years, but none of them lasted longer than from three days to a week, or was attended, so far as we can learn, by any cardiac complication. Twelve years ago he had a well-marked attack of gout, and since then from three or four other paroxysms, the most severe one five years ago, after a violent quinzy, when both great toes were affected. For several years before his aphasic attack, he was subject to flatulent dyspepsia, and had occasional outbreaks of eczema. It should be noted here that neither gout nor rheumatism were hereditary in his family, and that the most frequent cause of gout—over-indulgence at the table—was notably absent in his case, as he was usually very abstemious both in eating and drinking. In November, 1877, he had a severe attack of renal colic. The concretion was arrested in the ureter, and not discharged until the end of ten days, after repeated paroxysms of colic. The stone, on analysis, was found to be composed of uric acid. On February 1, 1879, he attended a concert in evening dress, and on his way home became thoroughly chilled. During the night he was awakened by pain and oppression in the chest, these symptoms continuing during the following day. As there was no evidence of pulmonary lesion, but merely tenderness over the middle portions of the chest anteriorly, on both sides, with pain in these situations on movement of the pectoral muscles, the symptoms were

¹Dr. A. B. Ball. A contribution to the study of aphasia, etc. *Archives of Medicine*, vol. v. No. 2, April, 1881.

referred to muscular rheumatism. Within a few days he was able to return to business, but was still so far from well that some more serious disturbance was apprehended by his medical attendants.

On February 11th, the date of his aphasic attack, he was in much better spirits. At half-past eight in the evening he was seen in his office writing a letter. A few minutes before ten o'clock he rang his bell violently, and was found by his servant lying on the lounge talking unintelligibly. I saw him not more than five minutes afterward. He was conscious, but unable to answer questions except by a confused muttering. The face was slightly flushed; pulse soft, easily compressible, about 90 per minute; the first heart sound feeble, and no murmur audible. Incomplete right hemiplegia and right hemi-anæsthesia. Was apparently aware of the nature of his attack as he pointed to his right arm and left frontal region. By gestures he finally succeeded in directing my attention to important cases in his note-book, requiring attention on the following day. At eleven o'clock he was seen by his partner, Dr. Dubois, and with slight assistance walked up two flights of stairs to his bedroom. On the following morning he complained of paroxysms of pain in the left frontal region. This symptom, which yielded to local applications of hot water, annoyed him frequently for several weeks, and recurred at intervals during the whole course of his illness. Repeated examinations of the heart failed to disclose any morbid condition except feeble action and moderate hypertrophy. No albumen or casts in the urine. Absence of fever, except on the evening of the third day, when there was a slight rise of temperature which lasted only a few hours. From this time his physical condition steadily improved, and by the end of six weeks his general health was fairly restored. Beyond slight paresis of motility and sensation on the right side the only marked change was the aphasic condition to be presently described. During the summer and autumn of 1879 his physical condition remained fairly good. The kidneys performed their work well, although it was evident from the occasional appearance of traces of albumen and casts in the urine, and from the enlargement of the left ventricle without valvular murmurs, that the kidneys had probably undergone cirrhotic changes. At no time was any increased arterial tension noticed in the sphygmographic tracings, but this absence was ascribed to muscular degeneration of the cardiac muscle, as feeble action of the heart was a constant symptom throughout his illness.

In March, 1880, he had another attack which was supposed to

be due to a small cerebral hemorrhage. At dinner, while talking with a friend, he suddenly turned his head to the right, and began muttering incoherently. With assistance, he immediately left the apartment and walked to his bedroom, muttering all the way with his head turned to the right. At my visit, half an hour later, when his consciousness was fully restored, he said that the attack began with an explosive noise in the head like a pistol-shot. Immediately he heard some one talking to him over his right shoulder, and turned to see who was addressing him.

Every word uttered by himself, he said, was mockingly repeated by this imaginary individual, and the mutterings his friends had heard were his indignant protests against the insult. On examination there was found slight paralysis, with numbness and anæsthesia on the *left* side. These symptoms disappeared after a few days, his mental condition remaining without apparent change. Shortly after this attack it was evident that his heart was failing in power. He frequently complained of breathlessness on exertion, and the heart sounds were feeble, with occasional intermittence of beat. Toward the end of May he was seized with what proved to be his final attack. The symptoms were slight fever for several days; oppression in the chest with shortness of breath; slight cough, generally dry but occasionally accompanied by expectoration tinged with blood; and marked tenderness over the region of the heart. At a few examinations a faint aortic obstructive murmur was heard, or rather a soft blowing sound over the base of the heart near the aortic valves, with the first sound. Urine nearly normal in amount; specific gravity varying from 1012 to 1018; no albumen and no casts except a few hyaline cylinders found at one examination. These symptoms were hardly sufficient to warrant a positive diagnosis, but they seemed to point to endocarditis with possibly myocarditis, and this view was confirmed, or at least considered plausible, by Prof. J. T. Metcalfe, who saw him in consultation. The urgent symptoms subsided by the end of a week, but he was still much prostrated, and complained of giddiness and mental confusion. On one occasion he exhibited in a marked form the so-called rotatory phenomenon, turning over rapidly to the right, and would have rolled out of bed had he not been prevented. On June 19th, about 3 P.M., he suddenly became totally blind. Dr. Dubois, who saw him shortly afterward, found him still partially blind, but gradually regaining his vision. At my visit, two hours later, he was perfectly conscious, with his sight fully restored. Half an hour afterward he fell into a quiet slumber, from which he

suddenly awakened at 7 o'clock, exclaimed "Oh!" and died instantly.

In considering the aphasic symptoms which constituted the most striking and interesting feature of his case, a few preliminary remarks on the essential nature of aphasia may be permitted before analyzing the symptoms in detail.

The interchange of thought between members of the human family is carried on by means of various symbols, that is, by signs which stand for the ideas they represent; for example: articulate sounds, written language, gestures, facial expression, mathematical, musical, and other signs. In aphasia this symbolic function, or capacity to *interpret* and *express* thought in a symbolic form—the *facultas signatrix* of Kant—is more or less seriously impaired. In some cases the chief difficulty is in the direction of *symbol-expression* (ataxic aphasia), the concept being present, but failing to enunciate itself on account of some lesion in the motor track concerned in the expression of symbols. In other instances the concept is present in the mind, but the appropriate symbol for it is forgotten (amnesic aphasia). In a third class of cases there is also a defect in the capacity for *comprehending* symbols. Certain auditory and visual impressions, especially those of word symbols, fail to recall into consciousness their corresponding concepts, although the capacity for forming such concepts under the influence of other stimuli may still be retained. When concepts can no longer be formed, the lesion involves the fundamental processes of thought, and extends beyond the sphere of simple aphasia. The latter term fails, however, to recognize the impaired capacity to *understand* symbols, and as most cases of aphasia present some degree of this derangement, Finkelburg¹ has proposed to substitute the word "asymbolia" as a generic term for all the phenomena of

¹ *Berl. Klin. Wochenschrift*, 1870, Nos. 37, 38.

aphasia. Kussmaul¹ prefers the term *asemia*, suggested by Steinthal, as being still more comprehensive; "symbol" represents an idea behind it, whereas "sign" often represents merely an emotion. In the following description of the aphasic symptoms in Dr. A.'s case, we shall use the word "symbol" in preference to "sign," as there was no difficulty in comprehending or expressing emotions. Our classification is based upon that of Spamer.²

I.—EXPRESSION OF SYMBOLS.

a. Disturbances of speech. On the morning following the first paralytic seizure, by which time the general shock to the brain had abated, it was evident that the cerebral disturbance was limited chiefly to the *verbal* expression of ideas. His general intelligence was fairly well preserved, and he understood much that was said to him, but there was a marked defect in verbal expression. His principal difficulty was with proper names and common nouns. When a glass of milk was held before him he said: "That is something to drink," recognizing at once its several attributes, its color, uses, etc., but the word which combined these qualities into a single concrete expression, or symbol, he could not utter, even when the word was repeated to him. He had less difficulty with adjectives, verbs, and adverbs, that is, with words of less concrete symbolic character. His vocabulary of proper and common nouns very soon began to increase. Within the first few days we succeeded in teaching him a number of such words by directing his attention to the movements of the lips and tongue in pronunciation. My own name, being short and easily pronounced, he learned in one day, and rarely afterward forgot it. Long names of individuals, or long words which he

¹ *Ziemssen's Cyclopædia of Medicine*. American edition, vol. xiv, p. 609.

² C. Spamer. *Archiv für Psychiatrie*, Bd. vi, p. 526.

rarely had occasion to use, he seldom mastered completely at any period of his illness. During the summer and autumn of 1879, his vocabulary increased so as to include a considerable number of words used in ordinary conversation. With these he generally succeeded in expressing his ideas fairly well, but an attempt to leave the beaten track resulted in mental confusion and inability to proceed with the conversation. In rare instances his conversational powers astonished his friends, and gave him delusive hopes of ultimate recovery. On one occasion he conversed with fluency on various topics for nearly an hour, with a friend who had not met him for several years and was unaware of his illness. His friend noticed no aphasic disturbance during the interview, and was greatly surprised afterward on learning the facts of the case. Such flashes were, however, only intermittent, and it became more and more evident that any thing like perfect recovery was hopeless.

In conversation, true *paraphasia*, that is, the substitution of wrong words, was rarely noticed. Almost invariably the word uttered bore some resemblance to the correct one, and differed from it in only some of its letters. Thus the first letters were usually correct. This fact was of great assistance to him in conversation, as it enabled him, when he knew the first letter, to find the correct word in a dictionary or work of reference, *where he at once recognized it as soon as he saw it*, showing that the concept was present in his mind in a latent form, and needed only the right stimulus to recall it into consciousness. His Medical Register was frequently consulted for physicians' names he was unable to pronounce, as he retained, to a marked degree, his interest in news affecting the medical profession.

In the expression of musical and other non-verbal sounds, as in singing, whistling, and imitation of various significant sounds, there was no observable deficiency.

As regards the *alphabet* and *numerals* the same cannot be said. At the outset of his illness he was able to pronounce only a few letters, and could not count above four. With training, however, he in time learned most of the alphabet, but never succeeded in spelling any but short and simple words. Counting he reacquired quite perfectly, and was able to solve simple sums in arithmetic, that is, to express their answers verbally. Even when unable to do this he could often *write* the answers correctly. When both these efforts failed him he was frequently able to recognize the correct answers if shown to him in writing. During the latter part of his illness he supervised his business accounts, and rarely failed to notice mistakes in them made by others. This circumstance belongs, however, rather under the head of *symbol-comprehension* than under that of *symbol-expression*.

b. Defects in writing. At the outset of his illness there was complete *agraphia*. When asked to write the word "cat," he took the pencil in his left hand, and drew three perpendicular lines, naming them one, two, three. As we shall see in a later illustration, this substitution of numerals for letters and words was at first very noticeable. He knew the number of letters required for the word "cat," but there was *no attempt at the formation of letter symbols*, although he was perfectly aware that his straight lines were not letters. Under training he gradually learned to form letters with his right hand, and after several months could copy simple sentences correctly, sign his name in his usual clear and elegant handwriting, and even write short sentences of his own composition, but more than this he never succeeded in accomplishing.

c. Gesture language. The capacity for expressing ideas by gestures seemed to be unimpaired. He retained much of his natural vivacity of manner, more in fact than could

have been expected in a person of his keen sensibility, when he found himself cut off from the ordinary modes of social intercourse. His gesture language had always been a prominent characteristic, and now became an important aid in the expression of ideas. Names of individuals and objects, which he was unable to remember or to pronounce, he frequently succeeded in recalling to others by gestural description, and this was very noticeable even early in his aphasic attack.

II.—COMPREHENSION OF SYMBOLS.

Before entering upon this branch of our subject it should be noted that the senses of sight and hearing in the present case were perfect, so far as could be determined by the usual tests. With respect to vision, the only exceptions to this statement were a transient attack of total blindness a few hours before death, and occasional attacks of hemiopia. Prof. H. D. Noyes, who made an ophthalmoscopic examination of his eyes in the autumn of 1879, reports that "he found no remarkable change in the optic nerves or retinae. The arteries of the nerves were rather small, and, with this exception, nothing abnormal was noted."

A.—*Comprehension of Auditory Symbols.*

a. Spoken words. Early in his illness, on my remarking to him one day, "Dr. Peters called to see you," he replied, "I don't know him." The name was repeated several times, but he failed to recognize it, although it was the name of an intimate friend. The written name was then shown him. "What a fool I am," he exclaimed, "of course I know him." This was the first instance in which my attention was drawn to the fact that certain auditory impressions failed to be converted into concepts, although the conceptive faculty remained intact. Not long afterward he noticed

this peculiarity himself, as was shown by his remarking to me: "The words I can't pronounce are the words I can't *hear*." This observation, the general correctness of which was verified by repeated experiments, points to a very interesting peculiarity in his case. The words over which he stumbled in conversation were words which made no intelligible impression on his mind when repeated to him, and, conversely, the words he failed to understand in conversation were words he had great difficulty in pronouncing spontaneously. The concepts represented by these word symbols we were generally able to recall to his consciousness by other means, such as writing, gestures, etc., but even then he was unable to express them, except after a certain amount of training. This "word-deafness," except when it was possible to stimulate the conceptual centres by visual or other impressions, made it extremely difficult to determine how much of his aphasia was due to the *ataxic* and how much to the *amnesic* element.

b. Musical and other sounds. His appreciation of music was fortunately well preserved, and was a source of much pleasure to him. In attending concerts and operas he exhibited his usual good critical taste. The significance of other sounds, such as the tone of a bell, the striking of a clock, etc., was perfectly understood.

B.—*Comprehension of Visual Symbols.*

On the third day of his aphasic attack a scroll of Scripture texts was held before him, and he was asked to read the following sentence: "We love Him because He first loved us. While we were yet sinners Christ died for us." He read aloud as follows: "We he have two three that I have to have the same. I have two three." The substitution of numerals for words is here again noticed as in a previous illustration. The words "the same" probably refer to the

repetition of "love" in the first sentence. He was aware that this rendering of the text was incorrect; in fact he almost always knew when he read aloud incorrectly, and expressed impatience thereat. Later in his illness when he was able to read sufficiently well to gather from the newspaper the main points of news, he remarked to me that there were always words in every long sentence which conveyed no impression to his mind, and that he was compelled to form his idea of the meaning of such a sentence from the other words whose meaning he understood. The significance of many of these uncomprehended words could be conveyed to him in other ways, showing that his failure to recognize the written symbols was not always due to a defect in the conceptual centre, but rather to a lesion in the channel of transmission from the optical centre for word symbols to their ideational centres.

The same difficulty extended at first also to the comprehension of *written numerals and their combinations*, but, as we have already seen, he reacquired, to a certain extent, this capacity under training. *Gesture language* he understood perfectly from the start.

The degree of impairment in intelligence, otherwise than in the comprehension and expression of symbols, it was extremely difficult to determine, for reasons already given. His intimate friends were satisfied that there was much less general mental deterioration than those who met him casually would infer. His memory of incidents in his own life, of the past illness of his patients, and of numerous other details was strictly accurate, so that we could rely upon his statements upon such points in every particular. In business matters he always manifested his usual tact and good judgment. During the last few months of his life he was a constant attendant at the surgical operations of the New York Hospital, of which he was an attending surgeon, and

his criticisms showed that he retained not merely a general interest, but also his special knowledge in surgery. On several occasions he assisted me in minor surgical operations and dressings, with his usual deftness and attention to details. At whist, euchre, and all games with which he had been familiar, he was as expert as ever. During the winter of 1879-80 he consulted numerous medical works on the subject of aphasia. Since his death I have seen a sheet of paper containing his notes of reference to articles on this subject in English and French works and journals. The titles, dates, etc., are strictly correct, and are written in his usual clear and elegant handwriting. His memory of location was particularly well preserved. He could always turn without hesitation to the right place in books he wished to consult, remembered the houses of friends—that is, their relative positions in this city,—and in numerous other ways showed that he perfectly understood the spatial relations of objects. The only exception to this fact was a singular symptom which annoyed him for several months, viz.: a tendency to reverse the natural position of objects which he handled, such as table-knives, spoons, pencils, canes, etc. He immediately recognized his mistake, however, and corrected it, but always spoke of the inclination as irresistible.

As an aid to the interpretation of the aphasic symptoms in the present case, we reproduce, below, Spamer's diagram representing the several tracts between the reception of impressions, the comprehension of these impressions, and their expression.

It will be noticed in the above diagram that the tract from *P* to *B* is represented by a straight line, while the tract from *P'* to *B* pursues a circuitous route. By this distinction Spamer attempts a rough explanation of the difference observed in most cases of aphasia between the comprehension of *auditory* word symbols and the comprehension

of *visual* word symbols. Cases of marked word-deafness without ordinary deafness, seem to be extremely rare; at least there are very few instances of this kind on record. The tracts for *all* auditory impressions, he supposes, lie in close connection, and may be represented by a single

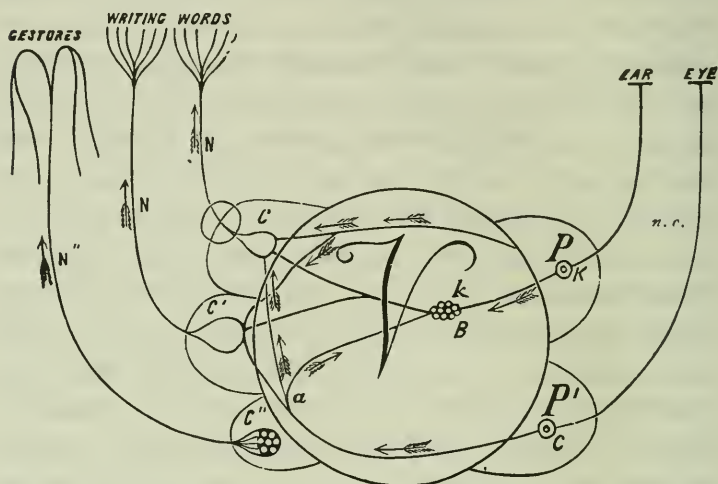


FIG. 7.

The circle in the middle of the diagram, V , represents the ideational tracts. From the right the excitations of the sensory nerves pass into the brain.

$n. a.$ = auditory nerve. $n. o.$ = optic nerve.

P and P' represent the places where the auditory (K) and the optical (G) impressions are perceived. When the impressions reach these points we have merely sense-perceptions without associated conceptions. The association with definite corresponding conceptions takes place only when the excitation travels onward to B , the conception. From this point the excitation may proceed to C , C' and C'' , the centres of coordination for movements in speech, writing and gestures.

N , N' and N'' are the motor nerves concerned in symbol expression (speech, writing, gestures). At their termination these nerves are broken up into fibres distributed to individual muscles.

The diagram represents the reception and tracts of *word symbols* through the eye and ear. The tracts of other auditory and ocular impressions are not designated.

straight line. With visual impressions the case is different. Aphasic patients very generally recognize material objects, but exhibit a marked defect in understanding written and printed words, as well as in expressing the concepts in speech and writing. The tract for visual word symbols is

therefore more or less widely separated from the tract for other visual impressions, and lies in some parts of its course near the centres of coördination for speech and writing, or near the tract from *B* to the latter. This explanation is ingenious, but hardly satisfactory. If the tract from *P'* to *B* should be represented by a circuitous route, that from *P* to *B* could scarcely have been *direct* in Dr. A.'s case, because the word-deafness was even more marked than the word-blindness, although both auditory and visual impressions, with the exception of word symbols, were interpreted with equal acuteness. Indeed, our main reliance, when the word symbol failed to be recognized by him in conversation, was to present the word to him in writing. The reverse process, that is, the presentation of the auditory, in place of the visual, word symbol rarely succeeded. In other words, he seldom understood the spoken words when he failed to comprehend the written form.

DR. SEGUIN'S REPORT OF THE AUTOPSY.

The autopsy was made twenty hours after death, on June 20th. The body was well preserved in ice.

Head.—The dura mater is abnormally adherent to the calvarium, on both sides equally; no thickening of dura. Pacchionian bodies small. Marked subarachnoid effusion, which has gravitated to posterior regions. Dura of base normal. The basilar artery is really a continuation of the right vertebral artery; the left being only 1 mm. thick. The right vertebral and the basilar arteries are the seat of patches of arteritis, separated by regions of healthy tissue, but nowhere obstructing the flow of blood. Circle of Willis is complete and patent. The carotids, just below the circle of Willis, are extraordinarily thickened, quite rigid, but not calcareous; their wall is nearly 1 mm. thick. The same alterations in patches can be traced in the accessible branches

of the middle cerebral arteries; the anterior cerebrals are only slightly affected. Nerves at the base normal. The left hemisphere is the seat of a large depression caused by the destruction of several convolutions, viz.: the whole of the inferior parietal lobule, with the first tier of temporal gyri. The posterior extremity of the angular gyrus, and the whole of the ascending parietal, are preserved. This lesion is a yellow patch lying in the region supplied by the terminal branches of the left middle cerebral artery.

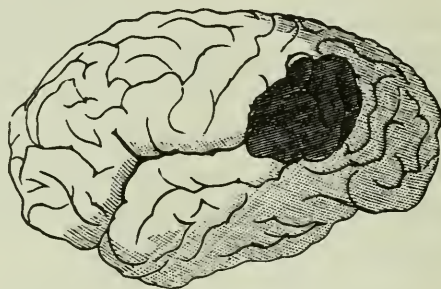


FIG. 8.

Lateral view of left cerebral hemisphere, after Henle. Shaded spot shows the superficial location of the yellow patch.

To external examination, the remaining convolutions are normal, more especially the third frontal, the ascending frontal, and the anterior gyri of the island of Reil. The first branch of the middle cerebral artery on the left side is pervious, though there are a few patches of arteritis near its origin. The main trunk of the artery, in the fissure of Sylvius, and its two terminal branches are pervious to the confines of the patch, and in the pia covering the patch. The patch was probably caused by blockade of smaller arteries which cannot be traced. The right hemisphere presents a healthy surface. On opening the fissure of Sylvius, the middle cerebral artery is found patent but bearing a few patches of thickening.

The brain is sliced in transverse vertical sections.

Section No. 1, about 37 mm. (one and a half inch) from apex of frontal lobes, presents no lesion.

Section No. 2, at a distance of 25 mm. behind No. 1, passing through the posterior extremity of the third frontal convolution and cutting off the apex of the temporal lobe, is free from lesion.

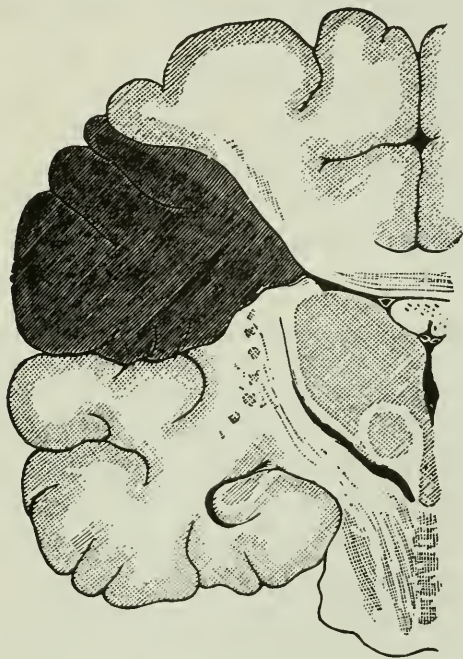


FIG. 9.

Diagram of transverse vertical section through left hemisphere, showing the extension inward of the patch. This view corresponds to section No. 4, described in the text.

Numerous fine slices made in the speech tract in this region (left side) reveal no alterations of structure.

Section No. 3, 25 mm. further back, showing the lenticular ganglion and the thalamus, no lesion.

Section No. 4, made at 25 mm. behind No. 3, passing

through the anterior limit of the yellow patch above described, and cutting through the posterior extremity of the thalami. There is no lesion to be seen except the yellow patch in the left hemisphere, and its full extent is well shown; besides destroying the convolutions it extends deep into the white substance of the hemisphere to the roof of the lateral ventricle.

Section No. 5, made at a distance of 25 mm. posterior to No. 4, reveals the penetration of the yellow patch as just described.

Section No. 6 shows no lesion.

The brain was afterward finely sliced up without any other lesion being discovered.

Sections made at different points in the pons Varolii and medulla oblongata seem normal.

Cerebellum normal.

CONCLUDING OBSERVATIONS BY DR. SEGUIN.

Dr. A's paræsthesiæ and perversions of muscular sense were very curious. He referred his sensations of numbness on the right side to homologous regions in the hand and foot, viz. : the distribution of the ulnar nerve and that of the musculo-cutaneous in the leg and foot. In the right side, generally, the paræsthesiæ were of drawing up, or tightening, and as if a strong rotatory movement were going on in each limb around its longitudinal axis, the hand in pronation, the foot in inversion. The patient's account of these subjective movements never varied, and he would often illustrate them by moving his hand and forearm in extreme pronation and rotation.

The impairment of muscular sense of which he complained was something which I had never met with before. If he did not use his eyes in prehending objects with his right hand, he would find that he had seized them by the

wrong end. He sometimes found himself standing with the head of his cane on the ground and its point in his hand. Frequently, in my presence, he essayed to grasp a pen or pencil with his head turned away, and repeatedly he found himself holding the object by the wrong end, and this after turning it over three or four times to get its outlines.

Yet with these perversions of sensibility there was no common anæsthesia, either to pricking, to cold, or to æsthesiometer points.

Dr. A's aphasia was complex, but the striking feature in it, during my six months' observation, was the word-deafness.

He could express himself fairly well in short sentences, and might for a little while carry on a commonplace conversation with a non-expert without betraying his defect; but he frequently failed to find the right word, and often found it only after struggling a good deal.

In attempting to speak he would often, after failing to get the proper noun, use a corresponding verb or employ synonyms, showing that his idea or concept was always correct, but that his vocabulary was faulty. He could copy written or printed characters quite readily, but experienced great difficulty in writing spontaneously.

All the auditory relations of language were much impaired. He used to say that going to church and listening to a sermon was to him all a mixed-up, meaningless jargon, like "drub-arub-drub." He could catch very few words. In ordinary conversation, familiar short sentences were apprehended readily; equally simple sentences, containing other than the most commonplace words, had to be repeated again and again. Reading from a book was jargon to him. Writing from dictation was impossible, and even the alphabet was poorly executed in this way. The sound of the letter *c* seemed the one for which he was most deaf.

Yet his hearing was not impaired (I never tested it carefully), and he understood and appreciated music. While a lecture or a sermon was unintelligible, he enjoyed a concert and claimed to appreciate it. He whistled and hummed airs correctly—much better than he spoke.

I often questioned about and tested him for hemiopia, with negative results. Occasionally he had attacks of moving fortification lines in the left fields of vision, but these were evidently phenomena of the migraine type.

The pathology of the case is obscure in many respects.

The arteritis (see Dr. Peabody's description) is not of the senile type, and the patient's statement, that he had never had syphilis, was positive, and, we believe, perfectly trustworthy. This would, therefore, be one of the best authenticated instances of non-specific endarteritis deformans, leading to obliteration of the calibre of small arteries, ischæmia of a cerebral territory, and softening.¹

The location of the lesion is peculiar, and some years ago would have been considered as destructive of the modern theory of aphasia. In view of the experiments of Ferrier, Munk,² and others, however, it seems clear that the lesion occupied a portion of the brain which is concerned in the reception of sensory impressions from various sources, more especially the eye and ear.

So long as aphasia was looked upon as sometimes a form of motor disorder, a difficulty in the emission of language, and in other cases as dependent upon verbal amnesia, it was impossible to explain its production by a lesion of the parietal or sphenoidal lobes. In the last two or three years the elements of imperfect perception of the written signs and spoken sounds of language—word-blindness and word-

¹ It is very much to be regretted that the cerebral arteries and the brain itself were not examined microscopically; but the autopsy was allowed only on condition that the brain be not retained for examination.

² Consult: Ferrier, *The Functions of the Brain*, New York, 1876; Munk, *Ueber die Functionen der Grosshirnrinde*, Berlin, 1881.

deafness respectively—have received some recognition, and these phenomena are perfectly explicable by lesions placed in the sensory or perceptive regions of the cortex and internal capsule.

In such cases the aphasia is indirect, not due to any interference with the channel for the emission of sound-forming impulses, but to a break in the other part of the circuit, viz., the receptive organ.

Dr. A. B. Ball, of New York, is the author of the article from which the foregoing large extract is made, and my small share in it is the description of the lesion found in the brain, and some general remarks upon the pathology of aphasia. In this connection I quote from the article because the lesion seems to indicate the postero-inferior limit of the motor area of the hemisphere. Although a large part of the inferior parietal lobule, and the first tier of temporal gyri, together with the associated white matter, were necrosed, there was no permanent hemiplegia. At the beginning of the illness, for a while after the attack, "slight paresis of motility" was noted. Whatever value this case may have for the study of indirect aphasia, it certainly will rank high as a negative case in the question of cortical motor localizations.

CASE 5.—Abscess of the left frontal lobe of the cerebrum, without motor phenomena.¹

On April 11, 1880, I was asked by Dr. J. Lewis Smith to see a case in consultation with himself and Dr. J. R. Leaming. The patient was a young married woman, aged about 28 years, who had formerly enjoyed good health and had borne several children. During the month of February one of these children had died after a severe illness, and she had undergone considerable fatigue. She seemed depressed, weak, and anæmic afterward.

About four weeks before the date of consultation she complained of pain over the left eye. This was soon accompanied

¹ *Archives of Medicine*, vol. v, No. 1, Feb., 1881, p. 107.

by swelling and exophthalmus, and on March 24th Dr. Knapp was called in and diagnosticated orbital (sub-periosteal) abscess. This was opened on March 26th by Dr. Knapp.

It was remarked that the pus was under great tension, and that it spurted out a considerable distance when released. Pain ceased at once, the exophthalmus disappeared, and the wound quickly healed. During the first few days of April all seemed going on well ; the wound was healed ; the patient was free from pain ; she was taking tonics, and on the 3d made a call on a near neighbor.

During the night of April 3d and 4th, one week before my examination, she awoke with severe headache and vomiting ; ever since she has lain abed, presenting the following symptoms : headache, chiefly mastoid and through the base of the skull ; occasional vomiting ; irregular respiration ; irregular and very slow pulse, varying from 60 to 50 beats per minute ; stupor and general feebleness. As negative points there were no symptoms about the eyes, objective or subjective, except a partial ptosis of the left upper lid (which had been incised) ; no fever, chills, convulsions, paralysis, aphasia ; at no time had there been coma. The urine was free from albumen.

Examination.—Patient was soporose, but could be roused by loud speaking ; she answered questions as if half asleep, but in such a way as to leave no doubt as to the preservation of language. She put up both hands to the mastoid regions when indicating the seat of pain. A minute inspection showed no paralysis except about the left eye, whose upper lid drooped and whose internal rectus was inert. The pupil on the left side was not fully dilated, but it was a little wider than the right. The optic nerves appeared somewhat congested, and were dim at their periphery, but there was no actual choking. Patient appeared to feel pinching well everywhere. The thermometer showed no fever. The pulse varied from 53 to 66 beats per minute, and it was a reluctant, delusively full pulse, with no real strength. The breathing was easy and regular, but friends of the patient described quite well a Cheyne-Stokes breathing which they had observed. There was neither redness nor tenderness about the site of the orbital abscess.

I diagnosticated an abscess of the brain probably in the left frontal lobe, and expressed the opinion that the patient was in imminent danger. She died the next day in a comatose state ; no new symptoms having been observed.

It was then learned that for two years Mrs. F. had suffered from frequent attacks of headache, lasting several hours. The pain was frontal, and sometimes extended along the nose and into the left temple. There had never been symptoms of chronic nasal catarrh.

The autopsy was made by me on April 13th, about thirty hours *post mortem*, in the presence of Drs. Knapp, J. R. Leaming, J. Lewis Smith (the attending physician), and Richard Wiener. We found a large abscess, the size of an

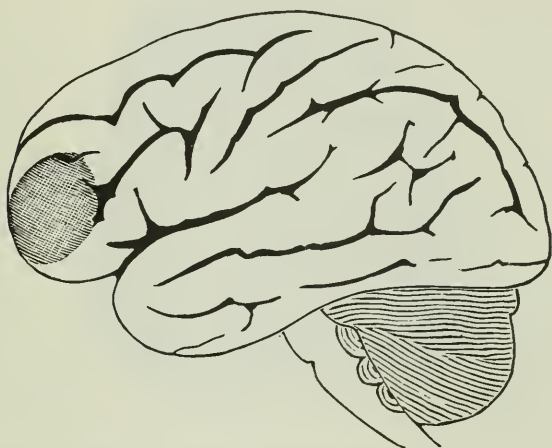


FIG. 10.

Apparent location of the abscess, drawn on an Ecker's diagram of the brain.

English walnut, in the left frontal lobe. It seemed to lie wholly under the cortex cerebri, in the convolutions of the orbital lobule, and in the second frontal convolution. Viewing the hemisphere from the side, the apparent posterior limit of the abscess was the anterior border of the lower part of the third frontal gyrus. Fig. 10 indicates the seat of the soft, fluctuating, bulging abscess. Its size and penetration were not then determined, as it was thought best to harden the brain as a whole, before making sections.

The external connections and origin of the abscess were most interesting. There was only one point of adherence between the diseased frontal lobe and the dura mater, and that was over the orbital plate of the frontal bone immediately under the swollen frontal lobe. There the dura mater was thickened and adherent to the pia mater and cortex cerebri, forming the inferior wall of the abscess, over a space as large as a ten-cent piece (about 15 mm.). Under this patch of pachymeningitis the orbital plate of the frontal bone was necrosed and perforated; a probe was easily passed into the orbit.

In the orbit, under its periosteum, pus was found, and a part of the roof and the inner wall of the orbit were carious. Careful dissection by Dr. H. Knapp showed disease of a similar kind in the ethmoidal cells and frontal sinus. I need say nothing more of the conditions of these parts and of the pathology of the orbital abscess, as the case has been fully reported from this point of view by Dr. Knapp.¹

The appearance of the necrosed orbital plate and of the thickened, adherent dura mater, was precisely similar to what I have several times seen in cases of suppurative disease of the internal ear with cerebral abscess by contiguity. The genesis of the abscesses must have been alike in the two situations.

In December, the brain having been sufficiently hardened in bichromate of potash solution, I embedded it in Guden's microtome, and made several horizontal sections through the whole brain with the view of demonstrating the relations of the abscess. These cuts showed that the abscess was of quite as large a size as at first supposed, almost perfectly globular in shape, measuring about 38 mm. in diameter. It contained ordinary pus, and was lined by a distinct membrane 1-2 mm. thick. The anterior,

¹*Archives of Ophthalmology*, vol ix, p. 185.

inferior, and external limits of the abscess were thinned cortex and pia mater; superiorly, posteriorly, and internally, it was bounded by apparently normal white substance. The whole of the white centre of the frontal lobe, except a portion near the convexity of the hemisphere, was destroyed to within 10 mm. of the folds of the island of Reil, and about 8 mm. of the head of the nucleus caudatus. The mass of white substance connecting the inferior and posterior part of the third frontal convolution and

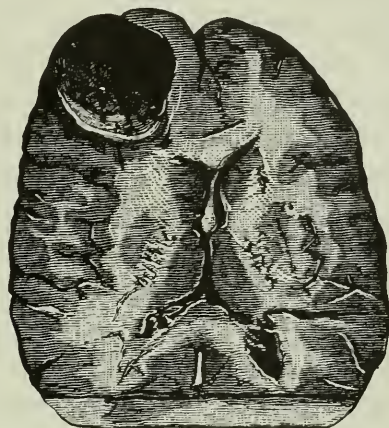


FIG. II.

Relations of the abscess as shown in a horizontal section of the brain made at the level of Broca's speech-centre. Drawn from a photograph of the specimen. Occipital lobes cut off.

the anterior gyri of the island of Reil with the internal capsule, was uninjured.

This fact is of capital importance in estimating the bearing of this case upon the current notions of cerebral localization.

The above description of the topography of the lesion, especially its posterior limitation, is made from the surface exposed by the lowest cut made, viz., one passing through the speech-centre of Broca, about 10 mm. above the

apparent commencement of the fissure of Sylvius (pia still adherent). Fig. 11 is faithfully drawn from a photograph taken of this section-surface. The rest of the brain was healthy to the naked eye.

This remarkable case seems to me of much importance as a negative contribution to cerebral localization. It is in exact accord with recent experimental data, and with the *post-mortem* findings of the last ten years, that an abscess placed like this one should give rise to no motor symptoms, and should not cause aphasia. It is wholly within what are now called the inexcitable districts of the brain. The only symptoms present were the partial paralysis of the left third nerve (more immediately caused by the orbital abscess?) and signs of intracranial pressure. Yet it is important to note that in spite of the enormous pressure which must have existed there was no actual neuro-retinitis.

I have elsewhere reported another case of (smaller) abscess in precisely the same location (left frontal lobe) in which no symptoms referable to this lesion were present.¹

On the other hand numerous autopsies are on record in which a smaller lesion (softening, hemorrhage, etc.), placed a centimetre further back in the left frontal lobe, involving the posterior part of the third frontal gyrus or the band of white substance between it and the nucleus caudatus, has given rise to severe symptoms, hemiplegia or aphasia, singly or combined.

In the paper just quoted I have described such cases.

This case has the same negative importance as Case 4: serving to indicate the anterior limit of motor activities in the hemisphere. It shows that the lower part of the first and second frontal, and the orbital lobule of the frontal lobe, have no direct motor connections with peripheral

¹ A contribution to the study of localized cerebral lesions. Case 6. *Transactions of the American Neurological Association*, vol. ii, pp. 122-4, N. Y., 1877.

parts of the body; and, also, that these regions of the brain are non-excitabile.

CONCLUSIONS.

The following conclusions may be legitimately drawn from the cases of localized cerebral disease (twelve in number) which I have published in the last four years:

1. The motor area of the cerebral cortex and allied white substance extends anteriorly as far as the lower half of the second and first frontal gyri, and posteriorly as far as the anterior part of the interparietal fissure. This statement is justified by Case 7 of my first paper (lesion of the left frontal lobe), and Cases 4 and 5 of the present paper.

2. The region lying between the limits indicated above, the middle regions of the hemisphere, on its convexity and (to a certain extent) on its median surface, including the posterior parts of the first and second, the whole of the third, frontal gyri, the whole of the ascending frontal and ascending parietal gyri, with their terminations in the longitudinal fissure known as the paracentral lobule, with probably the upper parietal lobe,—all these cortical parts, with their associated segments or fasciculi of white matter, have strong motor functions, being in direct relation with the muscles of the face, tongue, arm, and leg. This general statement is supported by the remaining nine cases in the two essays, in which destructive lesions of this area gave rise to spasm or paralysis on the opposite side of the body.

A further and more elaborate induction is permissible from these nine positive cases:

- a.* The lower part of the third frontal gyrus is intimately connected with the organs of speech (and the function of language).—Cases 1, 2, 3, and 4 of former essay.

- b.* The middle parts of the ascending frontal and ascending parietal gyri are directly connected with the arm of the

opposite side.—Case 5 of first essay, and Case 1 of present paper.

c. The upper or posterior part of the ascending frontal and ascending parietal gyri, and the paracentral lobule (also the upper parietal lobule?), are directly connected with the lower and upper extremities of the opposite side, and perhaps more closely with the leg.—Case 6 of first essay, Cases 2 and 3 of present paper.

I can not offer any case bearing on the questions of the location of the facial and ocular centres; though I now have under study a living case of exquisite epileptiform facial monospasm, which has been controlled by a strict bromide treatment.

ELONGATION OF THE SCIATIC NERVE IN LOCOMOTOR ATAXIA.

By WILLIAM A. HAMMOND, M. D.

THE history of the whole subject of nerve-stretching for the relief of various diseases of the nervous system has been so thoroughly given quite recently by Drs. Fenger and Lee,¹ that it would be a work of supererogation for me to go over the ground they have so fully covered. I will only say, therefore, that it appears that for the relief of locomotor ataxia nerves have up to this time been stretched as follows:

1. By Langenbuch, of Berlin, in 1879, Sept. 13. Patient had for several months suffered with the ordinary symptoms of locomotor ataxia. Left sciatic was first stretched, and twelve days afterward the right sciatic, and both crural nerves were subjected to like treatment. All ataxic symptoms disappeared in the lower limbs, as did also the electric-like pains. Pains, however, appeared in the upper extremities, and it was determined to stretch the nerves of these parts. But the patient died while being anæsthetized with chloroform. The *post-mortem* examination, made by Prof. Westphal, showed that the spinal cord was healthy.

2. Esmarch, in 1880, stretched the nerves in the axilla for a supposed but doubtful case of locomotor ataxia. The

¹ Nerve-stretching. This JOURNAL, April, 1881, p. 263.

operation was followed not only by the relief of the pains which had been experienced in the arms, but by the disappearance of all pain and ataxic symptoms from the lower extremities.

3. Erlenmeyer, in 1880. This was an old case. The right sciatic was stretched June 22d, the incision being made between the great trochanter and the tuberosity of the ischium. There was no relief of the symptoms. Nevertheless, on July 3d, the left sciatic was stretched, but the result was similar.

4. Debove, Paris, 1880. Patient had suffered for six years with pains in the lower extremities; subsequently there were incoördination and atrophy of the same parts.

November 18th, the left sciatic nerve was stretched, the incision being made in the middle of the thigh. The pains at once ceased, and the incoördination began to diminish. Two weeks after the operation the sensibility was normal, and the patient could move the legs without exhibiting more than slight traces of incoördination. He could stand, and could walk a few steps with the assistance of another person.

5. Debove, December 16, 1880. Pains mainly confined to the upper extremities, although there were plantar anæsthesia and incoördination. The right median and ulnar nerves were stretched. Pain lessened in right arm and abolished altogether in left arm. The incoördination was so much diminished that the patient was able to walk without assistance.

6. Dr. Fenger, of Chicago, was the first in this country to perform the operation in question in locomotor ataxia. The case was an undoubted instance of the disease, and had lasted about ten years.

December 28, 1880, the nerves of the lower extremities were operated upon. The crural nerves were first exposed

on each side by an incision just below Poupart's ligament. They were stretched, replaced in the wounds, drainage tubes were inserted, the incisions were closed with antiseptic sutures, and Lister dressings applied. The patient was then turned on his face, and both sciatic nerves were subjected to like treatment. Both wounds healed by the first intention, but there was no relief except as regarded the pain. Bed-sores ensued, and on February 15th the patient died pyæmic.

7. Socin, of Basle, 1881. The patient, a man, 33 years of age, had the ordinary symptoms of locomotor ataxia. The right sciatic nerve was stretched. The wound did not heal by the first intention, but the pain on the right side ceased. The left sciatic was then operated upon. Fourteen days afterward the patient died from multiple embolism, caused by thrombosis of the right popliteal nerve.

Up to the present time, therefore, seven cases of nerve-stretching for the cure of locomotor ataxia have been performed. Of these, two (Fenger's and Socin's) died from the effects of the operation, and one (Langenbuch's) from the narcosis of the chloroform administered. In one (Erlenmeyer's) there was no improvement. In all the others there was more or less amelioration, even in those in which death occurred. I have now to report the results of my own experience, which is based upon two cases.

CASE 1.—Mr. F., of Newark, Ohio, consulted me, June 19, 1880, for an affection which there was no difficulty in recognizing as locomotor ataxia. There were electric-like pains in the lower extremities and marked incoördination, the patient being obliged to walk with a cane. The patellar tendon reflex was abolished on both sides; both pupils were strongly contracted. There was partial paralysis of the bladder.

I saw him at intervals till May 5, 1881, when, at my suggestion, he came to New York to consider the question of having the sciatic nerves stretched. I gave him the reports of several cases

to read, in which the operation had been performed with more or less success, and he determined to submit to the operation.

Up to this period his disease had steadily advanced. In walking he required not only the assistance of a cane, but also that of some person holding him by the arm of the opposite side. The pains were very distressing.

On the 8th of May, assisted by Dr. G. M. Hammond, I operated on the right sciatic nerve, the pains in the right leg being more severe than in the other one ; the incoördination greater.

I made an incision, three inches in length, at about the junction of the middle with the lower third of the thigh, immediately over the usual course of the sciatic nerve. I intended to stretch it just before its division into the peroneal and popliteal, but I found that the division took place high up, the two nerves being situated, as they came from beneath the biceps muscle, over an inch apart. The internal or popliteal being by far the larger branch, and the pains being almost entirely limited to it and its branches, I placed the little finger of my right hand under it and gradually lifted it from its bed. It was apparently stretched about an inch. The wound was then closed with ordinary sutures and adhesive plaster.

During the operation the patient held a cone, made of a towel, and containing a sponge saturated with ether, to his mouth and nose ; and though he was at no time completely under the influence of the anæsthetic, the sensibility was so benumbed that he felt nothing more than what he described as a slight scratching.

At his earnest request I allowed him to walk from the lounge to the bed, a distance of ten or twelve feet. He did so, he said, with greater ease than for two years past. That night he had almost constant twitching of the muscles above and below the point at which the operation was performed, but there were no pains. By the third day the wound had entirely healed by the first intention, and I then made a thorough examination with the view of ascertaining the results.

I found that the pains in that leg had entirely ceased.

That the coördination was so much improved that the patient was able to walk without any assistance, not even requiring a cane.

That the insensibility of the sole of the foot had almost disappeared.

That the patient could flex all the toes, an act he had not been able to perform for over a year.

Such being the apparent benefits it was determined to operate on the nerve of the left side, as there were still pains in that extremity. Accordingly on the 13th, assisted by Drs. G. M. Hammond and H. M. Norris, I operated as in the first instance. The nerve had, on this side, its usual course and distribution, and was stretched about an inch, rather less than more. The pains at once ceased, and the patient the next day noticed the most decided improvement in his coördinating powers. This wound also healed entirely by the first intention. On the 15th he returned home greatly improved, and very confident of an ultimate cure. He was then walking without a cane, could stand alone with his eyes closed—an impossible feat with him before the operation,—was free from pains, and there was, on both sides, slight patellar tendon reflex. The following letter just received from him, details his present condition :

NEWARK, O., *June 14, 1881.*

Dr. WM. A. HAMMOND.

Dear Sir :

Thirty days having expired since I left New York, I will now report.

During the past thirty days I have only had two slight touches of pain in my legs, and they were both very slight, and traceable to exposure and climatic changes. The incoördination in both legs is somewhat improved, and I can walk more erect, and do not have to look down so constantly when I walk, as heretofore.

There is still a weakness in my right ankle, first leg operated on, and stiffness of the foot, which seems slow to improve, and it makes walking rather tiresome. The cushiony feeling in the feet still remains, but there is an improvement over what it was before the operation.

Upon the whole, I think it safe to say that I am pleased with the results of the operation and would urge any one with same trouble to try it.

If you perform any more operations for this disease I should like very much to hear the results. From my own feeling in the matter I think you are on the right track, and the stretching will result in a cure in most cases if done in time.

P. S.—I can handle a pencil better this morning than for many a day.

CASE 2.—C. S., was sent to my clinique at the University of New York, by Dr. H. T. Boldt, May 12, 1881. It required very slight examination to discover the existence of an extensive development of locomotor ataxia. The incoördination was bad, and the patient described the pains in both legs as being very se-

vere. Standing or walking with the eyes closed was impossible. The disease had existed for over two years.

I described to the class the operation which I had a few days before performed on Mr. F., and suggested to the patient that a like operation should be performed on him. He consented, and desired that it should at once be done.

He was accordingly placed on the operating table, a towel with ether was given to him to hold and inhale from, and the operation was performed on the left leg. An incision about three inches over the course of the sciatic nerve was made, and the nerve was found in its usual position. A very smooth director was bent and inserted under the nerve, a tolerably thick cushion of muscle being between it and the nerve. I performed the operation in this way so as to avoid, as far as possible, the destruction of the axis cylinder. The nerve was stretched apparently about an inch. The anæsthesia was sufficient to prevent pain, but not to abolish consciousness. The wound was closed, and the patient, getting off the table without assistance, walked around the room rapidly and well, exclaiming, "I am cured! I am cured!" and stating that all pain had ceased, and that he was as well as ever. I was assisted by Drs. G. M. Hammond, Osborn, and Boldt.

Although not showing the sanguine convictions of the patient, it was evident that he had very much improved in his coördinating powers. A few days afterward, I received the following letter from Dr. Boldt :

NEW YORK, May 20, 1881.

My Dear Doctor :

According to promise I give you some information regarding the case of locomotor ataxia in which you stretched the sciatic nerve, and am fortunate enough to add another case.

After the operation the man felt so well and strong on the leg operated that he *walked* home, did not use any car, as he was told by me, from the College to 11th Avenue, between 42d and 43d Streets. On the succeeding day he complained of severe pain along the course of the nerve and leg, which pain continued at intervals for five or six days, but I ascribe it to unusual long walk which he took, the distance being longer than any he had made for a number of years ; besides, he being a barber has been at work at his trade, disregarding the wound, all the time. He says that he feels much "stronger" on the leg operated upon, and *thinks* he will have the other one attended to also. Otherwise the stretch-

ing has made no change, the girdle-like sensations in epigastrium and abdomen continuing, etc., etc.

Relative to the ultimately good effects of the operation, I am by no means so confident as some European neurologists. At the same time, it appears to me that there is ground for hope that it may prove successful in some cases. I am convinced that in those instances in which gangrene, thrombosis, etc., have occurred, the nerve has been stretched too much. A very moderate extension is, I think, sufficient.

Relative to the point of election, I think the best place is just as the nerve comes from under the biceps muscle, at the junction of the middle with the lower third of the thigh. The operation at this point is very simple, the nerve lying immediately under the aponeurosis.

My rules, therefore, are: Make an incision, three inches in length, at about the middle of the posterior face of the thigh, at such a point that the middle of the incision comes over the border of the biceps muscle, at the apex of the triangle formed by it and the external ham-string, that is, at the junction of the middle with the lower third of the thigh. Cut through the aponeurosis carefully, and exposing the nerve, place the little finger of the right hand under it, and gently lift it from its bed. Let the line of traction be alternately downward and upward, so as to stretch the nerve in both directions. Return the nerve to its position, and close up the wound hermetically.

NOTE ON A PECULIAR EFFECT OF THE BROMIDES UPON CERTAIN INSANE EPILEPTICS.*

BY HENRY M. BANNISTER,

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THE action of the bromides is generally supposed to be to lessen cerebral excitement and the activity of the spinal reflexes, through an influence on the vaso-motor mechanisms of the great nervous centres. Its therapeutic action in epilepsy is supposed to depend on some regulating effect on the vaso-motor centres in the medulla, and this to be in the nature of a sedative to the circulation. I am not aware of any publication of its effects as a cerebral excitant in this disorder, or any statement that its administration is followed by symptoms of excitement or furious intoxication.¹ A considerable experience with epilepsy in private and dispensary practice had about confirmed my faith in the usually accepted views as to the effects of the bromides, and I was therefore surprised to hear, when proposing to employ the usual treatment in the case of an epileptic patient in this hospital, that the bromide medication was followed in this case by furious excitement and genuine epileptic mania. The patient, G. L., was a powerfully built man of about thirty years, in robust general health, but liable to very frequent attacks of the *grand mal*, not, however, as a rule, very severe. Beyond a slight

* Read before the American Neurological Association, June 18, 1881.

¹ I would here except the mention of mania following the use of bromides by Dr. Hammond in his treatise on nervous diseases, which did not occur to me when I first wrote this paper.

degree of general mental weakness, there are no very pronounced psychic symptoms, no delusions; he is trustworthy and ordinarily peaceable, and, like most of the other epileptics in the hospital, he is very religiously inclined. His attacks, even the most severe ones, are followed by only a very temporary dazed or confused condition, lasting from a minute or two to perhaps half an hour at the most, and between them he is as well as ever. He says he never had a headache in his life. He is temperate, not using even tobacco, and, on the whole, a very good patient for an insane asylum. His very frequent attacks, to which he has been subject for twenty-seven years, have naturally suggested treatment with the bromides, and it has been repeatedly tried in the hospital, with the effect of stopping his convulsions, it is true, but, at the same time, rendering him liable to attacks of genuine epileptic furor, and making him generally a very unsafe patient. He had, prior to his committal to an asylum, taken enormous quantities of the bromides, and he was declared homicidal in the verdict on which he was received.

Dr. H. N. Moyer, who had had the immediate care of the patient for nearly a year, and who had made the previous observations on the effects of the bromides upon him, told me that with large doses (3 ss *ter die*) he could be made almost unmanageable in three or four days; with small ones two or three weeks might be required. On one occasion he almost completely wrecked a screen room into which he was placed in one of his attacks of fury, in a few minutes tearing out, with his naked hands, lathing and plaster, and even beginning to make way with the window and door casings before he could be subdued. The stoppage of the bromide medication in every instance caused a complete subsidence of all such unpleasant symptoms, and the reappearance of his epileptic attacks.

Being somewhat curious in regard to these facts, though I could not discredit them, I resolved to observe the effects of the medicine upon the patient myself, and ordered for him Seguin's prescription of ten grains of the potassium and five grains of the ammonium bromide in an alkaline solution three times a day. The effect on his general condition was excellent; there were none of the unpleasant phenomena of bromism, not even an acne pimple, so far as observed. The attacks, which had been as frequent as two or three a week, ceased almost entirely, his mind seemed to brighten, he became somewhat more active physically, his functions were all regular, his pulse was all the while normal, circulation and sleep good. But with this general physical and mental improvement in most respects, there gradually appeared an offensive self-importance and quarrelsomeness; and after some three weeks of the treatment he was a very disagreeable and decidedly dangerous lunatic; and after he had made an unprovoked assault upon an attendant, and had nearly torn the clothes off from him, it was not considered advisable to continue it any longer. The patient was, a few days after the discontinuance of the medicine, the same rational and manageable subject as before, with also the former frequency of his epileptic attacks.

Two other epileptics in the hospital were reported to exhibit the same idiosyncrasy as regards the effect upon them of the bromides, and, as far as I have observed, correctly. One of these, a semi-demented case, became under the treatment exceedingly talkative and troublesome, though never dangerously violent. The other was always liable to violent outbursts of temper, and he was cautiously tried with hydrobromic acid in moderate doses, with the apparent effect of increasing this tendency. One or two other epileptic cases were not benefited by the bromides, but

none of the others in the hospital showed any such results of treatment with these drugs as did the cases I have mentioned. In the case of G. L. they have been observed by Dr. Moyer to follow the administration of potassium, sodium, and ammonium bromides, both when used separately and in combination with each other.

The large proportion of cases showing this idiosyncrasy—3 out of 21 epileptic patients in the hospital—would appear to indicate that it is not very rare, yet, as I have said in the beginning, I have not seen in print any mention of it. It has undoubtedly been observed before, and, in fact, I have the verbal testimony of Drs. J. S. Jewell and J. G. Kiernan, of Chicago, that they have observed similar cases to the ones I have mentioned above. It is not at all strange that such cases should be more frequent among the epileptics in an insane hospital than among the ordinary subjects of the disorder, for the former class are generally those whose violent manifestations have led to their seclusion as dangerous lunatics. It is easy to suppose that the bromide medication may have been indirectly the main cause of the commitment as insane in the case of G. L., though there is no real evidence that such was the case.

The fact that in these cases the suppression of the epileptic attacks by the bromides was accompanied by cerebral excitement and outbursts of maniacal furor, is strongly suggestive that the attacks themselves are somewhat of the nature of a safety-valve in some cases, and that the epilepsy is itself an alternative to acute and dangerous mania. Bad as it is, it may be the better alternative. The cerebral excitement is perhaps not to be ascribed directly to the medicine, but is secondary to its usual therapeutic effect—the suppression of the fits,—and this may be the best explanation of the phenomena. I leave these suggestions, however, as simply suggestions, and offer the facts themselves as

illustrating a possible action of the bromides in epilepsy that has not, to my knowledge, been very prominently brought before the profession.

It is my intention to make, with the coöperation of Dr. R. S. Dewey and Dr. Moyer, some further observations on the effects of treatment of this class of cases, and the above may be considered as merely a preliminary communication.

THE HYPOTHETICAL AUDITORY TRACT IN THE LIGHT OF RECENT ANATOMI- CAL OBSERVATIONS.*

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HOSPITAL.

AT a meeting of the New York Neurological Society, held on February 1st, of this year, I read a paper describing and giving the measurements of certain gigantic nerve cells discovered by myself, and showing by comparison that these cells were larger, as far as carnivora were concerned, than any of the giant cells described by Betz in his communication -entitled "An Anatomical Description of Two Brain Centres," which appeared in the *Centralblatt* of 1874.

In this article Betz claims that the cells discovered by him are larger than the cells of any other region of the central nervous system.

In making this statement its author does not seem to have borne in mind that the existence of as large and larger cells has already been established. While the statement would, therefore, be inaccurate as applied to man, it is demonstrably erroneous as applied to the lower animals, on whose brains his researches were first made; for here it can be shown that other cells, in lower centres, are decidedly larger than those of the so-called "cortical nests."

* Read in outline before the American Neurological Association, June 16, 1881.

From the brain of the same cat in which I discovered the giant cells before mentioned, I prepared some 150 sections from a larger number cut transversely to the cerebral axis, and embracing that portion of the brain included between the lower olivary altitude and the optic lobes of the corpora quadrigemina.

These sections enabled me to make a thorough study and examination of the cells contained in the optic lobes, nucleus tegmenti, and auditory nucleus. These cells are not a new discovery. They were known to Meynert, and their dimensions in the human brain have been given by him, but no one that I am aware of has given the comparative measurements of these cells.

I think it preferable in giving the comparative measurements of cells and their nuclei of different centres, to draw my deductions from measurements made of the cells contained in different centres of the same brain rather than to compare the measurements of different centres of different brains. I therefore propose in the present paper, to give the measurements and descriptions of cells of the optic lobes, nucleus tegmenti, and the auditory nucleus, from sections taken from the same brain, and also to compare them with the cells of the cortical group discovered by myself.

Let us occupy ourselves first with the consideration of the large multipolar cells of the optic lobes of the corpora quadrigemina.

The optic lobes differ anatomically from the post-optic lobes, or nates, chiefly in the fact that they possess a true cortical structure. Looking below the peripheral layer into the deeper structure of the optic lobes, a group of giant cells can be seen of about the same size and shape as those known to Betz. They resemble very closely the large multipolar cells found in the lumbar enlargement of the spinal cord. Their outlines are very distinct and their numerous

processes plainly visible. Many of these cells appear circular in the sections, but this is probably due to their being obliquely cut, or to imperfect staining. In their long diameter they measure from .03 mm. to .10 mm., and transversely from .02 mm. to .07 mm. Their nuclei measuring from .01 mm. to .025 mm. in diameter.

These cells are not found in nests. The largest cells do not always possess the largest nuclei; in fact, there seems to be no rule governing the size of the nucleus in proportion to the size of the cell; for a very large cell may be seen to be provided with one of the smallest nuclei, and a small cell may possess a nucleus whose circumference almost equals that of the cell itself.

The cells presented for observation in the following wood-cut, fig. 1, are specimens of cells from the optic lobes of the corpora quadrigemina of the cat. Although the cell shown in the centre of the illustration is a large one, its long diameter, exclusive of processes, measuring about .08 mm., it possesses one of the smallest nuclei. The processes in this cell are plainly visible. Let us now proceed to describe the cells of the nucleus tegmenti: a large nucleus situated in the same altitude as the optic lobes, and about midway between the central tubular gray and the ganglion of Söemmering. Here we find giant cells, circular and ovoid in form, with a central round nucleolated nucleus. They are densely settled, but are not arranged in any regular order. They possess from one to six visible processes. The ovoid cells measure from .07 mm. to .12 mm. in their long diameter, and from .03 mm. to .05 mm. transversely.

The circular cells measure from .04 mm. to .08 mm. in diameter. The nuclei of both varieties measure about .025 mm. in diameter. In fig. 2, a representation of both varieties of these cells is given. The words ovoid and circular refer to the cells apparently devoid of processes.

The cells discovered by myself were found in sections taken from the brain of the same cat from which the sections illustrating the cells of the optic lobes and nucleus tegmenti were made. These cells, unlike the two last mentioned, were found in the true cortical structure in the first primary arched gyrus, anterior to the fissure of Sylvius. They were found in both hemispheres, but only to a slight extent in the right one. In size they measured from .05 mm. to .12 mm. in length, and from .04 mm. to .06 in width, with a central, round, nucleolated nucleus measuring about .03 mm. in diameter.

These cells, when compared to the cells found in the

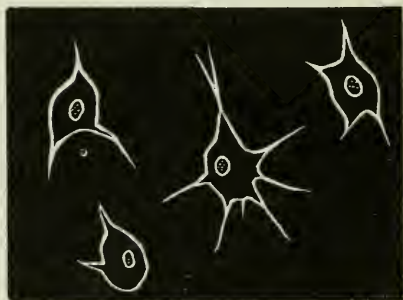


FIG. 1.



FIG. 2.

optic lobes and nucleus tegmenti, present marked similarities in many respects. Regarding their dimensions to the dimensions of their nuclei they are nearly identical; and, though many of the cells of the optic lobes resemble somewhat the appearance of the multipolar cells of the lumbar enlargement of the spinal cord, yet, when groups of the three varieties are compounded together, it may be seen that each variety is nearly a reproduction of the other.

Since reading my paper describing the new cells in the cat's brain, I have pursued my investigations farther, and examined the cortical structure of the human brain about

that area supposed to correspond to the point where I located the cells found in the cat's brain.

From about sixty or seventy sections made from both hemispheres, I was enabled to find five or six sections containing cells in every respect identical with those discovered in the cat's brain, though somewhat smaller and less numerous.

It is my purpose, by comparing the descriptions and measurements of the new cortical cells with the cells of the auditory nucleus and the other cells of the auditory tract, to show that the cells I discovered are presumably related to hearing, and to advance the theory that the cortical auditory centre is composed of a group of cells identical in form and structure with the cells of the auditory nucleus and tract, and that it is situated in the gyrus angularis, above the horizontal branch of the fissure of Sylvius, and at a distance from its posterior extremity equal to about one-fourth of its length.

A confirmation of this theory has been presented by Dr. A. B. Ball, in the *Archives of Medicine*, April, 1881, in which, in his article on "A Contribution to the Study of Aphasia," he mentions the phenomena of "word-deafness," resulting from a spot of cerebral softening involving that portion of the cortex situated above and at the posterior extremity of the fissure of Sylvius. Although the "centre" discovered by myself was located about 18 mm. anterior to the spot of cerebral softening shown in the illustration in Dr. Ball's article, yet their proximity is not without certain points of interest, for either the area containing the cells may have been more extensive than I supposed, or it is possible that the cells of that region, being deeply seated, may have undergone softening without that fact having been observed at the autopsy.

The destruction of the cortical auditory area would not

obstruct the hearing, but it would render it impossible to convert the impression received into a logical conception of the sound heard. Dr. Ball, speaking of his patient, says: "Early in his illness, on my remarking to him one day, 'Dr. Peters called to see you,' he replied, 'I don't know him.' The name was repeated several times, but he failed to recognize it, although it was the name of an intimate friend. The written name was then shown him. 'What a fool I am,' he exclaimed, 'of course I know him.' This was the first instance in which my attention was drawn to the fact that certain auditory impressions failed to be converted into concepts, although the conceptive faculty remained intact."

I can hardly agree with Dr. Ball in his statement "that the conceptive faculty remained intact," for, had such been the case a logical conception would have followed the auditory impression; on the contrary, when the name was mentioned he did not recognize the sound of it. But when the written name was presented before him, the impression was optical and was transmitted as such to the cortical optical centre for *perception*.

The fact that he could read and identify the name with the object showed that *so far and no further* the conception of Dr. Peters had not suffered. But insomuch as *perceptions* are the necessary basis for *conceptions*, it cannot be said that the patient's conceptual sphere was free, as the auditory perceptions were absent.

Quoting from Dr. Ball, the patient again says: "The words I can't pronounce are the words I can't *hear*," showing that only the impressions of a limited number of sounds failed to produce correct conceptions. This proves, to my mind, that either the cortical auditory "centre" was only involved in the process of softening to a slight degree, or that only a part of the "centre" came within the range

of the area of softening. I am rather inclined to the latter view.

Anatomically it is well established that after abutment of the auditory nerve root in the auditory nucleus, the auditory tract chiefly takes a course to the nucleus dentatus in the cerebellum, from thence through the brachium conjunctivum, and thence to the nucleus tegmenti. From this point the auditory tract is imperfectly traced, but it is clear that either through the lowest medullary laminæ of the thalamus, or through the posterior part of the internal capsule, it is continued to the cortex.

As far as I can glean from Flechsig's¹ great monograph, the fibres of this region can be traced to the vicinity of the posterior end of the fissure of Sylvius. This theory was in part anticipated by Meynert² and confirmed by Mendell, these authors tracing the tract as far as the nucleus tegmenti by chiefly anatomical methods. A further confirmation was offered by Spitzka,³ who identified the nucleus tegmenti in those reptiles possessing large cells in the auditory nucleus, and who notes that throughout the animal range the cells of the nucleus tegmenti and the special division of the auditory nucleus seemed to keep step in development.

The cells of the auditory nucleus are larger and their processes more boldly marked than any of the other varieties I have described in this paper, yet in their general characteristics they are similar to those cells found in the other groups. They measure from .07 mm. to .15 mm. in length, and from .04 mm. to .09 mm. in width, the nuclei measuring about .03 mm. in diameter.

While I would hesitate to commit myself to the view

¹ Forel. Untersuchungen über die Haubenregion. *Archiv fuer Psychiatrie*, vii. Spitzka. JOURNAL OF NERVOUS AND MENTAL DISEASE, 1880.

² Th. Meynert. Vom Gehirn der Säugethiere. Stricker's Handbuch.

³ Spitzka. Further notes on the brain of the Iguana and other Sauropsida.

that resemblance in size and shape of nerve cells necessarily involves similarity of function, yet it must be admitted that there is a certain parallelism between the cells connected with special nerve tracts. In this respect I need but instance the close resemblance existing between the giant cells of Betz and the cells of the lumbar enlargement of the spinal cord.

From this point of view the general similarity between the elements of the large-celled division of the auditory nucleus, of the nucleus tegmenti, and of the cortical nest described, lends support to the view that they are stations upon one tract. But a still stronger support is to be found in the fact that the size and development of the auditory nucleus, the nucleus tegmenti, and the cortical nest keep step, in the animal range, within certain limits, and as far as ascertained; that is, where the large-celled division of the auditory nucleus is largest the nucleus tegmenti is most massive and the cortical nest most numerous in cells.

This theory is in part confirmed by the report of a case of "Congenital Atrophy of the Brain," which appeared in the paper of Rohon.¹ Here, though the mass of brain substance was diminished to a remarkable extent, there was no atrophy of the auditory nucleus, of the nucleus dentatus, nor of the nucleus tegmenti.

As we ascend in the scale we find this progress greater in the cortical area than in the nucleus tegmenti, and greater in the latter, in turn, than in the auditory nucleus.

This presents a certain resemblance to three other cell groups,—those related to the innervation of muscles of animal life. Here the lowest group, that is, the multipolar cells of the anterior horns of the spinal gray, are presumably presided over by the multipolar cells of the tegmentum, and these in turn by the giant cells of Betz.

¹ Rohon. Untersuchung über ein Microcephalen-Gehirn, *Wien*, 1879.

These three groups of cells follow the same laws of progress that have already been cited for the sensory cells; that is, where there is an increase in the number of cells in the lowest group there is also an increase in the higher ones, and this increase in the higher group is greater in proportion to that in the lower; for example, just as there is progress in the development of cells in the anterior spinal cornu in the frog as contrasted with the proteans, so there is a still greater increase in the cells in the reticular field in lower mammalia as contrasted with the reptiles and amphibians, and a still more rapid stride in the higher mammalia over the lower, in whom these cell groups are really absent.

This anatomical fact is in parallelism with the physiological observation that the simple reflex acts are the common property of all animals, high and low; that progress in function is first manifested in the development of coördinate reflexes, which, in their turn, are merely stepping-stones for the highest nervous combinations of psychical life.

NOTES ON THE CENTRAL NERVOUS SYSTEM OF REPTILES.

By JOHN J. MASON, M.D.,

NEWPORT, R. I.

I. On a lateral fibrous cord in Ophidians and Saurians, the homologue of the ligamentum denticulatum.

In carmine-stained cross-sections this structure is seen as a dark oval object between the membranes, just above the ventral roots. When the membranes are removed before section, a deep depression is left in the outline of the myelon, marking the position of the ligament. Longitudinal sections show that it is composed solely of fibrous tissue.

These statements apply to the myelon of serpents. It has been present in seven different species which I have examined, including the rattlesnake, moccasin, and black snake (Gopher) of the South. Its development was found to be alike in all the species examined, and in all, it extended from the extreme caudal end of the myelon as far forward as the fourth ventricle. The same structure is also seen in *Anolius Carolinensis*, the skinks, horned toads, *Heloderma*, and the alligator, but developed to a much less degree than in serpents. In the horned toad, throughout the spinal cord, it is but rudimentary, and the same is true of the dorsal region of the alligator. I have not found a trace of it in any of the *Chelonina*, not excepting the caudal region of the snapping turtle-*Chelydra serpentina*.

Reissner¹ does not seem to have found it in the lamprey (*Petromyzon fluviatilis*), and Grim² does not mention nor figure it in his work on *Vipera berus*.

II. On a normal ventro-dorsal compression of the myelon at the acute angle made by the articulation of the last cervical vertebra with the carapax in *Cistuda Carolina* (Holbrook), box turtle. In this animal the ventral surface of the carapax is very deeply and abruptly concave, and during the complete retraction of the neck and closure of the cephalic portion of the plastrum, the articulating surface of the body of the vertebra named, encroaches upon the vertebral canal, causing a marked change in shape of the myelon at this point. In cross-sections the entire lateral masses of gray matter are seen separated from each other by an interval considerably greater than at any other plane of section. The ventral horns stretch out laterally, terminate in pointed extremities, and contain but few ganglionic bodies, although at a plane just behind the cervical enlargement. In the dorsal part of the spinal cord, just in front of the lumbar enlargement, there are, in the ventral horns, many cells with large nuclei, although in general conformation these horns resemble closely those of the middle of the *pars dorsalis*.

Other Chelonians, with much the same abruptness in the curvature of the carapax, and with a retractile neck, have spinal cords flattened at the region above indicated, but probably never to the same extent as in the box turtle with its movable plastrum.

III. The optic chiasm of *Anolius Carolinensis*—American chameleon.

In six brains from this species which I have examined,

¹ "Beiträge zur Kenntniss vom Bau des Rückenmarkes von *Petromyzon fluviatilis* L.," von Prof. Dr. E. Reissner in Dorpat *Arch. f. Anat. u. Phys.*, 1860, s. 545.

² "Ein Beitrag zur Kenntniss vom Bau des Rückenmarkes von *Vipera berus* Lin.," von J. Grim. *Arch. f. Anat. u. Phys.*, 1864, p. 502.

the optic nerve of one side was plainly seen to enter a slit-like opening in the nerve of the other side, and apparently to traverse the latter by one and the same slit, bodily, as in the herring, according to Wagner.¹ Thin longitudinal sections show a complete crossing of fibres, but the nerve does not perforate the other bodily, but divides into three or four large bundles, which form a chiasm with equally large bundles from the nerve of the opposite side. In three of the five specimens, it was the right nerve which seemed to perforate the left. In the other two specimens these conditions were reversed. I have seen this external appearance of the chiasm in no other reptile. Goux² found that in the true chameleon the optic nerves were "*plutôt accolés que croisés l'un sous l'autre*," while, as stated in his communication, Dugès, in his comparative physiology, asserts: "*chez le caméleon le nerf gauche semble traverser tout entier le nerf droit.*"

¹ Dalton's Human Physiology, p. 519.

² Transactions of "Soc. de Biologie," 1856. I am indebted to an extract made by Prof. Seguin.

CHOREA IN THE AGED.

By WHARTON SINKLER, M.D.,

PHILADELPHIA.

CHOREA in old persons is regarded as a rare affection; but I believe it occurs more frequently than is commonly supposed, or than the books would lead us to imagine.

The disease is so frequently confounded with senile trembling or paralysis agitans, that, no doubt, it is often mistaken for one of those disorders.

I have several times met with well-marked instances of chorea in very old persons. I will relate two cases, which presented striking examples of the disease :

The first is Mary R., aged 82 years, who applied at my clinic at the Orthopædic Hospital and Infirmary for Nervous Diseases, in Jan., 1879. For fifteen years she has been an inmate of a widows' asylum. She says that she has always been uncommonly healthy. For the past three or four years she has been nervous, and easily frightened; she thinks because several of her associates have died in that time. Last winter she had some rheumatism in the knee, but has had no acute rheumatic attack. About six months ago she began to have movements of the hands. She did not notice them herself at first, but her friends called her attention to them. A short time later she found herself unable to keep her legs still. The movements have increased, and about a month ago, having been frightened, she became more nervous, and could not sleep at night. She thinks the movements keep her from sleeping.

Present condition.—The patient is healthy-looking, but says she is worn out from loss of sleep. Her appetite is good, and she is not troubled with dyspepsia or constipation. She walks well, but is easily fatigued, and is short of breath on exertion. She is unusually intelligent for her age, and seems to have a good memory. She seldom has headache.

Movements.—The legs are restless, but there is no extreme motion. There are occasional sudden twitches, or throwings out of the arms. The fingers and hands are in constant, irregular movements. She can hold a glass of water without spilling any of it, the voluntary effort controlling the movements, but a fine tremor replaces the choreic motions when these cease. There is no difficulty of speech. The eyesight has failed recently, but is still good.

Heart.—There is a systolic murmur heard at the apex, and the action of the heart is frequent, feeble, and intermittent. At every fourth beat there is a catch or interruption, and the next beat then seems to come hurriedly. There are no atheromatous deposits in the radial or temporal arteries. The urine contains no albumen.

Under the use of fluid extract of gelsemium, five drops three times a day, and twenty grains of bromide of potassium at bedtime, the patient became able to sleep well, and gained considerable strength, but the movements did not diminish. She said, however, that they did not annoy her as much as formerly.

She came to my clinic in March, 1881, after an absence of several months. She was very choreic, and said that she was sleeping badly. Her general health and her mental condition seemed about as usual.

Through the courtesy of Dr. Weir Mitchell, I had the opportunity of seeing a patient of his who was suffering from chorea at the age of 86 years. The history of the case is briefly as follows ;

J. M., æt. 86 years, a man of sound health, and free from taints, while travelling in California, a few months before I saw him, waked one morning with spasmodic movements of the whole left side. There was some loss of power in this side, and in the left side of the face. For several days there was suffusion of the left eye, and photophobia. He had slight derangement of digestion, and the bowels were sluggish. He had no headache, his mind was clear, and his memory good, except at times for words. The

movements were confined to the left arm, leg, and the left side of the face. They varied in intensity from day to day, but absolutely disappeared on voluntary effort, and during sleep. At the end of a month the movements had increased in severity, but the following month they became better, and he was able to walk about. When I saw him the left arm and leg were in constant irregular motion. The movements were varied in form, but were not extreme, and were increased by excitement. The side of the face occasionally twitched. There was a loud blowing murmur at the apex of the heart, and the pulse was hard and intermittent. He was depressed in spirits, but, with the exception of poor memory, his mental condition was very good.

This gentleman recovered after a few months' treatment.

Charcot, in a lecture on chorea,¹ states that in old persons suffering from St. Vitus' dance there is almost invariably associated with it a condition of dementia. This was certainly not the case in the two persons whose histories I have just related. I have also seen other cases where the mental faculties were unaffected.

Chorea in the aged resembles in nearly all of its features the same disease in children. The movements are less violent and less varied than they frequently are in youth. Speech is not often affected, and the facial muscles do not seem to be involved in many instances.

Rheumatism probably exerts the same influence on the causation of the affection at all periods of life. The fact that in both of the cases I have reported there was organic heart disease, indicates the connection between chorea and heart disease, which has been pointed out by writers on the chorea of childhood.

Besides the ordinary chorea—Sydenham's chorea, as it has been called,—we have the variety connected with hemiplegia or the "postparalytic chorea." In this variety there is a history of paralysis preceding the chorea, and the irregular movements take place chiefly on voluntary effort,

¹ *Med. Times and Gazette*, March 9, 1878.

while in true chorea, in many instances, voluntary effort controls the movements. This leads me to observe that we see the two types of chorea in old persons, namely, the variety in which the motions are continuous but are arrested for the time by an effort to perform some movement, and the form in which the irregular movements continue under all circumstances.

As before remarked, senile trembling and paralysis agitans may be mistaken for senile chorea. This error should not be made when we consider that senile trembling is generally confined to the head and consists of a continuous rhythmical tremor. In paralysis agitans there is loss of power in the parts involved, the tremor is regular and not gesticulatory, and the history is of a tremor or trembling, which was slight at first and under control of the will, but which has gradually increased in extent and violence.

The tremor of sclerosis occurs during voluntary effort, and is connected with loss of muscular power.

Chorea in aged persons is by no means an incurable affection, Charcot, to the contrary, notwithstanding.¹ Dr. Mitchell's patient, whose case I related above, made a good recovery, and Dr. James Russell, in the *Med. Times and Gazette* for April 27, 1878, reports the case of a lady, 77 years of age, who had a violent attack of chorea of several months' duration, but who was cured, apparently by sulphate of zinc.

¹ *Op. cit.*

THE ACTION OF AN IRRITANT.*

By ISAAC OTT, M.D.

WHEN an irritant is applied to the skin it acts upon the nerve endings and the blood-vessels of the part, it having also a general and local action. The local action dilates the blood-vessels of the part, whilst it causes the other arterioles throughout the system to contract. Besides the local irritation of the nerves of the part, there is a reflected action through the nerves and the central nervous system upon the efferent nerves presiding over the muscular movements, circulation, and respiration. When a drop of bisulphide of carbon, or, after the skin has been rendered hyperæsthetic, a bull-dog forceps is applied to the back of the neck of a pigeon, the bird will run forward, then backward, rotating his body to the side opposite to that receiving the irritant, after which a hypnotic condition is seen for a few minutes, when he rouses up upon the slightest noise. Dr. S. Weir Mitchell has produced similar results with rhigolene, and lately Brown-Séquard has noticed similar phenomena with chloroform and chloral. The phenomenon with bisulphide I have already described a few years back.¹ Lately I have been trying to find other agents which would act in a similar manner upon the pigeon. The agents experimented with were dry and moist heat, turpentine, bro-

* Read before the American Neurological Society.

¹ JOURNAL OF NERVOUS AND MENTAL DISEASE, 1879.

mide of ethylene, parabromtoluene, a very irritating substance to the eyes, volatile oil of mustard, chloroform, ether, and alcohol. Of these articles, bisulphide, turpentine, and bull-dog forceps were the only agents producing these phenomena in the pigeon. In some cases the opposite leg and wing were partially paralyzed with anæsthesia of them, whilst hyperæsthesia ensued on the side of application. Upon cats and rabbits the carbon applied to the skin of the back part of the neck produces the wildest movements, followed by a remarkable disposition to sleep, and considerable anæsthesia of the extremities. These phenomena ensue in the pigeon when the surface of the cerebrum is destroyed, proving that the movements of body can be produced by gray matter at the base of the brain. When the surface of the cerebrum is removed no primary forward progression ensues.

Action on the circulation.—These phenomena were studied by means of Ludwig's kyniographion. About the end of a minute after the application of the bisulphide to the neck, the pulse falls considerably, whilst the pressure almost immediately rises, and continues to rise for some time.

Section of the vagi abolishes the reduction of the pulse, but the arterial tension increases as before. When the endings of the trigeminus in the nose are irritated, the pulse rapidly decreases as well as the number of respirations, as has been shown by Kratschmer. Brown-Séquard believed this cardiac arrest to be due to a direct reflex action, whilst Prof. Rutherford held that it was due to an excess of carbonic anhydride in the blood irritating the cardio-inhibitory ganglia, this excess being caused by arrest of respiratory movement. When he kept up artificial respiration he stated that there was no slowing of the heart. In my experiments with the bisulphide to the nose, with or without woorari,

and artificial respiration carried on through a tracheal canula, the heart was arrested as usual, showing that it is a pure inhibitory reflex. This reflex may come into play in operations about the jaws, causing sudden death.

Anæsthetic vapors or chloroform may bring this reflex into play, especially if anæsthesia is not very complete. The irido-sensory reflex, in ordinary anæsthesia by chloroform, is active, as I have often seen, and it is fair to presume that the play of the other reflexes may be present in part.

Effect on respiration.—When bisulphide is applied to the skin of the neck, and the surface of the cerebrum destroyed, the respiratory movements immediately increase, become deeper. When the bisulphide is applied to the nose, then the respiration soon decreases, even when the vagi are divided, showing that the trigeminal irritation calls into activity centres inhibiting the respiratory centre, like the same irritation inhibiting the heart.

Action on nervous system.—The inquiry arises, how are nervous phenomena to be explained? The cause of the phenomena is not circulatory, as the heart soon returns to its normal beat, whilst the pressure continues high, and the nervous symptoms continue some time. There is not sufficient anæmia of the brain to cause the series of phenomena. Their origin is not respiratory, as the breathing becomes deep and more frequent, which, so far as my experience goes, would not cause these changes. It seems to me that the phenomena are purely due to an excitation of the nervous centres themselves, and especially the inhibitory centres. When the trigeminus is irritated the heart is inhibited as well as the respiratory centres. Further, I have shown that reflexes can be inhibited by ganglia located at the base of the thalamus and head of the crura cerebri, and that these centres inhibit the general reflexes of the body, aided by spinal inhibitory centres.

I have also shown that these centres have fibres which demonstrate in the medulla and pons. The anæsthesia of the opposite side is explained by sensory irritation being carried up the cord on the same side and calling the inhibitory centres of that side into activity,—those about the base of the thalamus and head of the *crura cerebri*, which by their crossed action prevent the ascent of impressions, in a great degree, to the sensory ganglia above. That they pass mainly up the same side is due to the fact that the impulses upward meet here with less mechanical resistance, it not being necessary to traverse the gray matter of the cord. Not only do irritations of the skin prevent the transmission of the pulses upward, but they weaken or partially paralyze the motor-nerves of the opposite side. Thus, if I apply in a rabbit bisulphide of carbon to one side of the body, and then kill the animal by opening the chest, and after death irritate the sciatics, it will be found that the opposite sciatic is very much reduced in irritability. Reflex palsy upon this theory would be “inhibited paralysis.” The discovery that an irritation of one side of the body will produce a partial paralysis of the opposite side is worthy of the attention of the neurologist in the explanation of reflex disturbances. The rotation to the opposite side is explained by a disturbance of equilibrium between the exciting and inhibiting ganglia of the central nervous system, which results in a deviation to that side. The state of hypnotism is simply induced by a peripheral irritation which has called the inhibitory ganglia into activity and temporarily suspended the functions of the will. The substance of my theory about the nervous system is as follows: that the gray matter is divided into inhibitory and excito-motor material; that the inhibitory is mainly located about the base of the thalamus and the head of the *crura cerebri*; that they are reinforced by inhibitory centres

above and by spinal inhibitory centres below; that these ganglia have their special fibres, beginning to decussate in the pons and ending a little below the rib of the calamus, and then passing down the internal half of the middle third of the lateral columns of the spinal cord; that anæsthesia after hemisection of the spinal cord is due to an excitation of these ganglia, whilst hyperæsthesia is due to a removal, in part, of the influence of these ganglia; hyperæsthesia and anæsthesia may also be due to affections of the excito-motor ganglia; that some partial palsies are to be explained by reflex irritation of inhibitory ganglia. Whilst holding these ideas I believe in an excito-motor nervous system, that the motor nerves decussate, that the sensory also do, and that the cerebral excito-motor ganglia are also localized.

Effect on temperature.—When a pigeon is held loosely in the hand and the bisulphide applied to the skin of the neck, the rectal temperature falls.

The conclusions on the effect of irritants are as follows:

1. Certain irritants applied to the skin produce a variety of phenomena of the nervous system. Other irritants do not.

2. These phenomena are not due to circulatory changes as usually held, but to an excitation of the central nervous system.

3. Irritations of the skin diminish the irritability or partially palsy the motor nerves of the opposite side.

4. They also produce anæsthesia by a stimulation of inhibitory ganglia.

5. When applied to the nose they inhibit the heart and respiratory centres.

6. They excite the monarchical vaso-motor centre.

7. They lower the temperature.

8. They dilate the pupil.

AMERICAN NEUROLOGICAL ASSOCIATION.

SEVENTH ANNUAL MEETING.

(OFFICIALLY REPORTED BY M. JOSIAH ROBERTS, M.D.)

First day, afternoon session.

The AMERICAN NEUROLOGICAL ASSOCIATION convened in the New York Academy of Medicine, June 15, 1881, for its seventh annual meeting. In the absence of Dr. Miles, the retiring President, the Secretary, Dr. Seguin, called the Association to order at 2.30 P.M., and introduced the President-elect, Dr. Roberts Bartholow, of Philadelphia.

Present—Drs. Amidon, Beard, Bartholow, Birdsall, Hammond, W. A., Hammond, G. M., Jewell, McBride, Morton, Ott, Rockwell, Seguin, Shaw, Spitzka.

Dr. BARTHLOW remarked that upon his arrival in New York he had been informed of the customary practice of the incoming President of the Association to make a few introductory remarks; but as this information was a surprise to him, he would take the liberty of proving an exception to the rule.

The reading of the minutes of the last annual meeting being called for, it was moved by Dr. McBride that as they had been printed and sent to each member for perusal their reading should be dispensed with. Carried.

The Council and the Secretary had no reports to make.

The Treasurer, Dr. E. C. Seguin, of New York, read his report, which, upon motion of Dr. Shaw, was adopted.

NOMINATION OF CANDIDATES.

Dr. J. S. JEWELL, of Chicago, nominated Drs. S. V. Clevenger and H. Gradle, of Chicago, for active membership.

The Secretary read a note from Dr. E. C. Spitzka, nominating Dr. Burt G. Wilder, of Ithaca, New York, for active membership.

Dr. E. C. SEGUIN nominated Drs. Charles K. Mills and Wharton Sinkler, of Philadelphia, for active membership.

The above nominations were referred to the Council to report at a future session.

COMMITTEE ON NOMINATION OF OFFICERS.

The President appointed the following Committee on Nominations : Drs. Jewell, of Chicago ; Isaac Ott, of Pennsylvania ; Amidon, Morton, and Rockwell, of New York.

MISCELLANEOUS BUSINESS.

Dr. J. SHAW moved that no case be presented to the Association unless it formed the basis of a written communication. He remarked that this motion was not intended to exclude the recitation of cases in the discussion of papers, but to cut off some irregular work which had been found unprofitable to the Association. Carried.

The Secretary read a letter from Dr. J. K. Bauduy, of St. Louis, to the effect that if his resignation as a member of the Association, which had been transmitted some months previous, had not been presented and accepted he would like to withdraw it and retain his membership. As his resignation had already been accepted, upon motion of Dr. Shaw, the matter was referred to the Council with power to act.

The Secretary read a letter from Dr. T. M. B. Cross, of New York, tendering his resignation, which was referred to the Council for action.

Dr. SEGUIN stated that he would read an amendment to the constitution, which he had proposed at the last annual meeting, and was to be acted upon at this. It was as follows :

Article III. In addition to Active Members there shall be a class of Honorary Members, not to exceed twelve in number, and a class of Associate Members not to exceed twenty-five in number.

Honorary Members shall be nominated in writing by six Active Members, reported upon by the Council, and elected only by an unanimous vote of the members present at the session following the one at which the nomination is made.

Associate Members shall be nominated in writing by two Active Members of the Association, reported upon by the Council, and

elected by a majority of the members present at the session next following the nomination.

Dr. JEWELL moved that the amendment be adopted. Seconded.

Dr. SEGUIN remarked that there were at present no Honorary or Associate Members of the Association. The reason why no step had been taken to secure the same was that the original promoters of the Association thought it best to wait until it had made some substantial progress in order to avoid the appearance of asking for names merely for the purpose of giving the organization a standing. Carried unanimously.

There being no further miscellaneous business, Dr. J. C. Shaw was called upon to read his paper, entitled "Tendon reflex in general paralysis of the insane."

At the meeting of the Association in 1879 he had presented a paper on the "tendon reflex in the insane." The opinions then expressed had been confirmed by subsequent extended observations, and many new facts had been learned. The object of his present paper was to communicate these to the Association. Observations had been made on 70 cases of general paralysis in men, and 10 cases in women. In the men it was found that the reflex was normal in 28 cases, that it was slight in 8 cases, absent in 13 cases, and exaggerated in 21 cases. Of these, *post-mortem* examinations had been made in 18 cases, and the spinal cords studied microscopically after hardening and mounting. A brief history was attached to each of these cases, and the state of the reflex as observed during life. In 5 of the cases the reflex was found absent, and *post-mortem* examinations showed sclerosis of the posterior column. In 4 cases the reflex was found normal during life, and *post-mortem* examination of the cords showed no lesion. In 8 cases the reflex was found exaggerated, and the *post-mortem* revealed sclerosis in the lateral columns on both sides, with a certain amount of diffuse sclerosis in all parts of the cords. Observation had shown that this exaggerated reflex is in direct correspondence with marked difficulties in speech and hemiparetic attacks, and this connection was susceptible of an anatomical demonstration. The doctor announced his intention of making another communication upon this subject.

Remarks.

Dr. JEWELL inquired for Dr. Shaw's idea of the inner mechanism in the cases cited, in which there was abolition of the tendon

reflex accompanied with disease of the posterior columns or portions of the same ; remarking at the same time that an answer to his question might involve Dr. Shaw's idea of the function of that part of the cord.

Dr. SHAW said that he believed the disease of the posterior column interfered with conduction in the sensory parts, and in that way the reflex was abolished. Whenever he had found the reflex abolished, *post-mortem* examination had shown the posterior columns to be very much diseased.

Dr. ROCKWELL thought it would be interesting to know how much experience there had been in observing cases where the tendon reflex was absent and the cord healthy. He had observed two cases in which there was no tendon reflex, and in which, so far as he was able to determine, the cord was perfectly healthy.

Dr. SHAW said that such cases had been observed, and that he himself had seen one. Examples of this sort were exceptional, and he could give no explanation of them. He was of the opinion that Westphal thought there was in such cases some disease of the cord, though it could not be demonstrated.

The President inquired if it was a true reflex.

Dr. SHAW believed that it was now claimed to be a true reflex, There had been several points observed which were not clear to him. He had observed all the facts he could in hopes of ultimately arriving at a rational explanation of them.

Dr. SEGUIN remarked that Dr. Gray had read a paper before the Association some three or four years ago upon the frequency of tendon reflex in healthy persons. He had examined a number of students in the Long Island College Hospital, and reported several examples of absence of the tendon reflex in healthy individuals. Dr. Seguin was much interested in Dr. Shaw's paper, and thought his investigations into the pathology of paralysis in the insane might lead to a fundamental pathological classification of general paralysis. The cases he had seen he had been only able to define in a coarse clinical way, owing to the want of a pathological basis for an useful and intelligent classification.

Dr. JEWELL remarked that he had been much interested in the subject of tendon reflex for a number of years, and the conclusion which he had at present reached was as follows : Where he found it absent he always suspected, unless there was good reason to the contrary, disease of the posterior columns of the spinal cord. The mechanism of such cases was exceedingly simple. The diseased parts lay in the path of the ingoing impulses, which have to

pass through the spinal cord. If there are no signs of disturbance besides the absence of the reflex he regarded it as one of a class of cases, of which he himself was an example, in which the tendon reflex was absent. Some persons were sensitive in this way, others hardly at all. The absence of this sign did not make it necessary for us to suppose that there is disease of the spinal cord unless there was some unequivocal sign of disease of the sensory tract. He thought the matter of absent and exaggerated reflexes had been made to appear more singular than it really is. He concurred with Dr. Seguin as to the great value of Dr. Shaw's paper, for it brought the results of *post-mortem* examination face to face with symptoms observed during life, and he felt sure that the author of the paper was on the right road, though a very long road, to a solid nerve pathology.

There being no further discussion, the Secretary proceeded to read the paper of Dr. John J. Mason, entitled, "Notes on the central nervous system of reptiles."

The paper consisted first, of observations on a lateral fibrous cord in ophidious saurians, the homologue of the ligamentum denticulatum; second, of observations on a normal ventro-dorsal compression of the myelon at the acute angle made by the articulation of the last cervical vertebra with the carapax in *Cistuda Carolina* (Holbrook), box turtle; third, of observations on the optic chiasm of the *Anolius Carolinensis*—American Chameleon.

Remarks.

Dr. SPITZKA remarked that there was room for the study of other peculiarities of the appendages of the nervous system which, without any presumable physiological value, had some interest as morphological curiosities. He himself had observed in three marine turtles that there was a thin rod of cartilage running from the dorsal face of the baso-occipital bone to the ventral face of the myelancephalon; whether this is connected with the nervous axis directly, or fused with its membranous investments, he had not ascertained. It certainly appeared to be a very aberrant anatomical feature.

The next paper was by Dr. Isaac Ott, "The action of an irritant."

The paper consisted of a recitation of experiments and the conclusions reached were as follows :

1. Certain irritants applied to the skin produce a variety of phenomena of the nervous system ; other irritants do not.
2. These phenomena are not due to circulatory changes, as usually held, but to an excitation of the central nervous system.
3. Irritations of the skin diminish the irritability or partially palsy the motor nerves of the opposite side.
4. They also produce anæsthesia by a stimulation of inhibitory ganglia.
5. When applied to the nose they inhibit the heart and respiratory centres.
6. They excite the monarchical vaso-motor centre.
7. They lower the temperature.
8. They dilate the pupil.

Remarks.

Dr. SPITZKA thought it was a defensible statement to claim that spontaneous exciting action resided in no special centre ; he thought that there was no central action that could not be traced back to a starting-point.

Dr. JEWELL inquired if Dr. Ott was of the opinion that these inhibitory centres were to be found in the base of the brain and that they could be reinforced both from centres above and below.

Dr. OTT replied in the affirmative.

Dr. JEWELL held a loose opinion to the effect that the reinforcing centres could not be looked upon as subordinate but must always be looked upon as super-ordinate or at least coördinate ; this was only an opinion and he would not undertake to defend it. He thought that the reinforcing centres were never below. Parts below could excite those above but not charge them with force. He did not question the facts brought forward by Dr. Ott, but only their explanation ; he thought that excitation might go upward or downward from the basal parts of the brain and in this way launch nerve excitations upon the central nerve axis, but reinforcing centres must be above not below those reinforced.

Dr. SEGUIN remarked that it would be interesting in this connection to recall Brown-Séquard's experiments with irritating vapors. He (Brown-Séquard) thought it was possible to arrest severe headache by forcing carbonic acid gas into the nostrils. Dr. Seguin had seen him arrest epileptic fits in guinea-pigs by forcing carbonic acid into their throats under pressure. A quack remedy for the cure of epilepsy, used in France some thirty years ago, was

the application of ammonia to the pharynx by means of a swab. He believed one of the German physicians interested in neurology had suggested the swallowing of a large mouthful of salt at the time of aura.

Dr. MORTON remarked that in two or three instances he had observed curious facts that could only be explained in this way. One patient had a tonic spasm involving most of the muscles of the face. This spasm would come on and last for several hours and then pass off. He made the experiment frequently of applying the galvanic current to the facial nerve, which would quickly develop the spasm, and then resolving it by striking three or four sparks from the static-electrical machine. He repeated the experiment with the Faradic current and satisfied himself that the spasm was truly reflex of the motor track of the trigeminal nerve. He then tried some experiments in the treatment of mimic spasm.

There being no further discussion, the Secretary proceeded to read the paper of Dr. H. M. Bannister, bearing the title of, "A peculiar effect of the bromides on certain insane epileptics."

Dr. BANNISTER related in his paper the apparent effect of the bromides on an epileptic under his observation at the asylum at Kankakee in Illinois. After the use of the drugs in question for a week or two, the epileptic paroxysms were interrupted, but there came on gradually a state of mental irritability, which at last rose to the pitch of homicidal mania with delusions. This state had been often produced in the same patient by the same means. Upon withdrawing the bromide the maniacal violence gradually subsided, and entirely disappeared on the return of the epileptic attacks.

Dr. BANNISTER referred to other cases of which he had learned, and to the rarity of similar observations in medical literature. He thought the observation important and suggestive, but offered no definite opinion as to whether the occurrence of the mania was directly or indirectly due to the bromides.

Remarks.

Dr. SPITZKA thought Dr. Bannister was mistaken as to the absence of records of this kind. There was a German alienist by the name of Stark, who had published a very carefully written paper, in which he admitted the statement made by the author of the paper just read, and forbade the administration of the bromides to such patients. Dr. Spitzka thought the statement would

apply to 25 per cent. of the chronic epileptics in institutions for the insane.

Dr. JEWELL remarked that the alleged action of the bromides was certainly not unknown, but its importance was such as to deserve more general consideration. In the case of epileptics it was important to recognize this action of the bromides. He thought it highly probable, at least feasible, that certain of the epileptic insane were in asylums as insane persons for this very reason. Dr. Bannister had mentioned this matter to him before writing his paper, and it was chiefly on this account that Dr. Jewell had urged him to write a history of the case.

Dr. SHAW had met with this condition in the asylum, but oftener in the dispensary, especially in children who had taken large quantities of the bromide.

Dr. SEGUIN had noticed quite a number of such cases, but did not believe it was the bromides. He thought it was the suspension of the epilepsy that allowed of the excitement of the psychical centres. Yesterday he had seen a little patient, a boy of twelve years, with a singular attack of petit-mal. He usually had more attacks in the spring; he had many "chills." The physician of the place in which he was attending school had given him the bromides, and after taking these two or three weeks he had no chills for two months. During this time, however, he became so thoroughly unmanageable that his schoolmaster was obliged to have him return home.

Dr. HAMMOND remarked that he had not had the privilege of listening to the reading of the paper, but thought, as Dr. Seguin did, when we came to remember how frequently the bromides were given to epileptics with the effect of having the paroxysms subside, and yet did not have these symptoms develop, it was difficult to account for them, when they did occur, as being due to the bromides. In 1869 he had read the first paper, certainly the first in this country, upon bromism. In that paper he had given the history of a man who had received a blow upon the head.

He had ordered one ounce of the bromide of potassium in four ounces of water, of which a teaspoonful was to be given three times a day. The patient took the entire contents of the bottle every day. He became highly maniacal, was arrested in the street for drunkenness, and convicted of the same before a police magistrate. At the instigation of Dr. Hammond he was placed in a lunatic asylum, where he remained for two months before the effects wore off. He thought it should be known that the

bromides would kill if taken in sufficiently large doses for a long time. The effect of the bromides was apt to develop very suddenly. The best way to avert danger or relieve a patient from the effects of the bromides was through the alimentary canal by purging. He never gave more than fifteen grains three times a day.

Dr. ROCKWELL remarked that discussion bore upon a case he had under treatment, and in view of what Dr. Hammond had said, it might be that he was killing his patient. A lady epileptic patient of his had been taking the bromides four or five years with the effect of causing a cessation of the attacks for fifteen to twenty months. It was now eighteen months since she had had an attack, and she was exceedingly depressed and suffered with hysteria. The question was whether to keep on with the bromides.

Dr. HAMMOND remarked that if he had epilepsy he would take the bromides all his life, and never stop.

Upon motion of Dr. Seguin, the Association adjourned.

First day, evening session.

The Association was called to order by the President, Dr. Bartholow, at 8.30 P.M.

Present: Drs. Amidon, Bartholow, Birdsall, Gibney, Hammond, W. A., Hammond, G. M., Jewell, Kinnicutt, Morton, McBride, Rockwell, and Seguin.

The Secretary read the minutes of the afternoon session, which were approved.

REPORT OF COUNCIL.

The Council recommended Drs. S. V. Clevenger and H. Gradle of Chicago, Burt G. Wilder of Ithaca, N. Y., and Charles K. Mills of Philadelphia for active membership.

The Council also reported that the resignation of Dr. J. K. Bauduy had been rescinded, and that he was restored to active membership.

Upon motion of Dr. E. C. Spitzka, the by-laws were suspended and the Secretary was requested to cast the vote of the Association for the election of members, which was voted in the affirmative.

REPORT OF THE COMMITTEE ON NOMINATIONS.

Dr. J. S. JEWELL, chairman of the committee, reported the following nominations :

President, Dr. William A. Hammond, of New York.

Vice-president, Dr. Landon Carter Gray, of Brooklyn, N. Y.

Secretary and Treasurer, Dr. E. C. Seguin, of New York.

Councillors: Dr. J. S. Jewell, of Chicago, and Isaac Ott, of Easton, Penn.

The first paper of the evening session was by Dr. A. D. Rockwell upon "Electro-muscular contractility in infantile paralysis."

At the meeting of the Association in 1879, the author had presented a case bearing upon this point, and the history of the present case was a supplement to the first as illustrating the fact that even when the galvanic current proved utterly powerless to cause contraction of the muscles, and the paralysis is complete and the atrophy extreme, we need not, necessarily, despair of a favorable issue. The patient in the case reported was injured by forceps in delivery, so that the right arm was, from the beginning, completely paralyzed.

A number of months subsequently Dr. Rockwell found the arm atrophied, seemingly as much as it was possible for it to be, and with an entire loss of electro-muscular contractility.

No strength of galvanism elicited the slightest reaction. The case was under treatment for one month before any electrical reaction was obtained ; but from the moment this took place improvement was rapid, and the arm was now of considerable use.

In the case which he had previously presented to the Association, it was at least six weeks before galvano contractility took place. He, therefore, said, bearing this fact in mind, that persistent effort should be made for weeks, or in some cases for months, before deciding that the case was utterly hopeless.

Remarks.

Dr. SPITZKA inquired what had been Dr. Rockwell's experience in regard to improvement in the case of paralysis of central origin.

Dr. ROCKWELL replied that he did not refer to central paralysis.

Dr. HAMMOND thought that all the members of the Association would agree that it was much more difficult to restore paralysis

when due to a peripheral injury than when it was central. He had published the history of a case where the muscular contractility was entirely abolished, so far as the Faradic current was concerned, but the muscles reacted to the current from a hundred-pile voltaic battery.

He thought Dr. Rockwell's case was interesting as showing what could be done in peripheral paralysis by persistent efforts. We all knew, he said, how difficult it is to restore peripheral facial paralysis with any current that we could apply to the face. Dr. Hammond inquired the strength of current used by Dr. Rockwell.

Dr. ROCKWELL remarked that at first the strongest current would accomplish nothing, but subsequently the current from fifteen or twenty ordinary carbon cells was used.

Dr. JEWELL remarked that he was of the opinion that in many of these cases of paralysis arising from peripheral disease, where there was no evidence of traumatic destruction of nerve tissue, even though the duration of the paralysis had been long, we ought to consider them far more hopeful than they were usually considered. He remembered the case of a lady in Moline, Ill., who had been delivered by forceps, and whose left sciatic nerve, at the point where it passed through the pelvis, had been crushed by the instrument and head of the child, so that for months she was paralyzed in that member from the hip down. At the end of eleven months, the atrophy was very considerable; the limb was utterly useless. There was paralysis of motion and sensibility in all parts except where supplied by certain nerve branches in front. She was placed under treatment, and it required one or two months of careful electrical treatment before any considerable sensitiveness of skin or muscles of the member was obtained. The galvanic current was interrupted in the various ways known. At last signs of improvement began to appear, the patient began to move the limb, and finally was advised to take a trip to Europe. In accordance with his advice, she there consulted Professor Charcot, and finally a medical gentleman in Belgium, who well understood the use of electricity, and who applied it together with massage *thoroughly*. The patient was now almost entirely well. He heard from her a few days ago, and she was then able to walk up what amounted to one hundred feet of elevation without the use of a crutch or cane. Although it was customary to look upon such cases as utterly hopeless, he thought that they should no longer be considered as such, and persistent effort should be made to restore the paralyzed muscles.

There being no further discussion, the paper of Dr. H. D. Schmidt, of New Orleans, was read by the Secretary, entitled: "Destructive lesion of the left cerebral hemisphere, with general pachymeningitis, and a large hemorrhagic cyst pressing upon the right hemisphere, of thirteen years' standing."

This case of cerebral lesion was worthy of being recorded, not only on account of the extent of the lesions, but also for the long period of time through which they existed. It illustrated the ability of the brain to bear a considerable amount of injury without causing a serious disturbance of the general health, or even of the mental faculties of the patient. The paper consisted of a history of the case so far as could be obtained, and an exceedingly interesting and remarkably accurate detailed account of the pathological findings. Accompanying the paper were six admirably executed drawings representing various pathological points, to which special attention was called in the paper.

There being no remarks, Dr. J. S. Jewell, of Chicago, proceeded to read his paper advocating "The early use of strychnia in myelitis."

He said his object was to call attention to the early and free use of strychnia in subacute (diffuse) myelitis and related affections of the spinal cord, in which one of the most important conditions presumed to exist is passive congestion.

He then gave, in some detail, the histories of several cases in which the treatment by strychnia has been employed apparently with success. An oral abstract of the paper was given to save the time of the Association. He closed by a brief statement of his views as to the pathology of the cases given, and as to the mode of action of strychnia.

Remarks.

Dr. HAMMOND said that he would like to ask the author of the paper, three questions:

First, whether the drug produced any tonic spasm; second, whether the cases cited were uncomplicated cases of spinal disease; and third, why they were not cases of spinal anæmia instead of spinal congestion. He wanted to know what distinction the author made between the cases cited as those of congestion and those which were called spinal anæmia. He had met with such cases, due to liver, lung, or stomach diseases, which were cured by large doses of strychnia; but he regarded them as cases, not of congestion but of anæmia.

Dr. JEWELL replied that the distinction was to him quite clear, though difficult to define, yet he did not despair of doing this.

Owing to the late hour, upon motion of Dr. Spitzka, the discussion of Dr. Jewell's paper was postponed until the beginning of the following session.

Upon motion of Dr. Spitzka, the Recording Secretary was authorized to cast the vote of the Association for the officers which had been nominated for the ensuing year, which was in the affirmative.

The President declared the Association adjourned.

Second day, afternoon session.

The meeting was called to order by President Bartholow, at 2.30 P. M.

Present : Drs. Amidon, Bartholow, Beard, Birdsall, Gray, Gradle, Hammond, W. A., Hammond, G. M., Jewell, Kinnicutt, Mills, Morton, Ott, Rockwell, Spitzka, Seguin.

The President announced that the members of the Association were invited to be present at a reception at Dr. Wm. A. Hammond's house, at nine o'clock in the evening.

The Secretary read the minutes of the previous session, which were approved.

The Council reported that they had examined the paper of another candidate, that of Dr. Wharton Sinkler, of Philadelphia, and recommended that he be presented to the Association for election.

Upon the motion of Dr. Spitzka, the Secretary was authorized to cast the vote of the Association, which was in the affirmative.

The Secretary read letters from the following absent members : Drs. Robert T. Edes, J. Van Bibber, and J. J. Mason, the latter inviting the members of the Association to a meeting in Newport.

Discussion upon Dr. Jewell's Paper. (Continued.)

Dr. SPITZKA remarked that he had made some experimental researches upon strychnia, and had observed some very remarkable phenomena. He would not dare to give strychnia in myelitis. He had artificially produced myelitis in dogs by means of the application of ice-cold water to their hind quarters. Experimenting in this way with two dogs, to one he gave a poisonous dose of

strychnia, and then killed both of them. In the case of the dog to whom strychnia had not been given, there was found striking pathological softening; but in the other dog, no change whatever was found. In these cases both dogs had been subjected to the same influences which are known to produce myelitis, and if any thing could be drawn from the experiments it would be to the effect that strychnia was of use in myelitis. Experiments on frogs show that strychnia had a local stimulating effect. Dr. Spitzka thought it was a molecular change which was produced, and accordingly, experimentally, it was advisable to use strychnia in the first stages of myelitis; however, he would not like to do it. Opinions formulated in regard to myelitis seemed to be vague. As far as he could judge there were cases of myelitis and hysteria that went together; that is, he meant that there were cases of myelitis with irritation where strychnia would be counter-indicated. There was a class of hysterical patients in which the majority bore strychnia well, but he had seen strychnia do harm and produce characteristic symptoms when it was given in small doses within the normal limits.

Dr. HAMMOND wished to ask Dr. Spitzka whether, in the case of the dog to whom he had given a poisonous dose of strychnia, he did not find the blood-vessels in the substance of the cord ruptured.

Dr. SPITZKA replied that whenever he gave strychnia in sufficient doses to produce death immediately, or very soon, that he had found hemorrhages.

Dr. HAMMOND enquired if such hemorrhages were not due to congestion of the cord.

Dr. SPITZKA replied that he had always considered them as due to respiratory interferences, and he could produce death by strychnia without congestion of the cord.

Dr. HAMMOND wished to enquire whether, in the case of congestion of the cord, the spinal cord was not rendered more susceptible to the influence of strychnia than when it was not congested. He wished to have this point discussed. He did not doubt Dr. Jewell's facts or results, but he did question his diagnosis, and did not believe that they were cases of congestion of the cord; but, on the contrary, thought they were cases of anæmia of the cord, otherwise strychnia would have produced its physiological symptoms. He referred to the questions he had asked the previous evening, and particularly to the distinguishing points between anæmia and congestion.

Dr. JEWELL remarked that he had not concluded his paper on account of its length and his fear of worrying the members of the Association by reading reports of cases. First of all, his object was to call attention to the early and free use of strychnia in what he had regarded as subacute myelitis and related diseases of the spinal cord. He had referred only to the practical aspects of the cases, knowing full well that their diagnosis would be questioned, and he was pleased that it had been done. He was aware that much confusion of opinion existed, especially in regard to the diagnosis, between spinal anæmia and spinal congestion, and he had pursued his studies in full view of that fact ; but for one he could not admit that our knowledge on this subject was in such a confused and chaotic state as some seemed to think. He thought that in ninety-nine cases out of a hundred we could differentiate more or less clearly between spinal anæmia and spinal congestion. He alluded to acute and passive congestion, and by the latter term he did not mean that which was of purely mechanical origin. That acute and passive congestion of the central nervous system existed no one doubted, and all would probably agree that we could diagnosticate congestion of the nerve centres. Difficult as it might seem, a diagnosis could be made between passive congestion and anæmia of the cord. By passive congestion he meant that which was of purely vaso-motor origin, and pertained not to the veins, but to the arteries and capillaries, the former of which were almost purely muscular in their middle walls, and were supplied with local vaso-motor mechanisms. The congestions which arose in consequence of loss of tonus in the muscular wall of the blood-vessels were those he had in his mind, whether due to loss of power in the muscular tissue itself or to loss of power in the vaso-motor system. In either case the vessels dilated under the influence of the expansive pressure of the passing blood. When this happened he considered that we had passive congestion, and it was this state which he assumed existed in the blood-vessels of the spinal cord or brain, especially when we consider the fact that they are generally surrounded by spaces, truly called perivascular, so that a better chance for expanding was offered than was found in other parts. As to the difference between spinal anæmia and spinal congestion, he would make the following points : Cases of spinal anæmia were made better by increasing the atmospheric pressure ; or, in other words, by sending patients thus affected from high altitudes to the seaside. Cases of spinal anæmia were better when the barometer stood high, and especially so if placed in a

chamber where atmospheric pressure was increased; and they were made worse when the barometer stood low, and by removing them to mountainous regions, or by exhausting the air from a chamber in which they were placed. Passive congestions were made worse, as is easily understood, when the barometer rises. If such cases were sent from the region of Chicago to the sea level they did not improve; but if sent to higher regions, such as Colorado, they got better.

The mechanism of the case is exceedingly simple. The increased pressure upon the body forces the blood from the surface into the air-tight cerebro-spinal cavity, so that the vessels within weakened vascular areas give way according to the degree of weakness of the muscular coat or interference with the local vaso-motor apparatuses. Such cases he never sent to cold regions, but always to warm regions. That was the case with spinal congestion, not so with anæmias. These latter cases were made better by exposure to cold. The contraction of the cutaneous blood-vessels thereby brought about, displaced more or less of the blood naturally circulating in the exterior, and caused a corresponding increase in the amount of blood that circulated in the interior of the body; this could be demonstrated experimentally. He had practically demonstrated this matter to himself, and was thoroughly convinced that cases of spinal anæmia were invariably better by moderate exposure to cold, while cases of spinal congestion were in various degrees made worse. And conversely, spinal anæmia was made worse by heat to the surface; but spinal congestion was made better on account of the blood flowing more freely in the surface. The dorsal decubitus benefited spinal anæmia, but not passive congestion. Then, again, in passive congestion there was marked diminution of all the reflexes effected through the congested zones of the cord. By the term vaso-motor anæmia he meant that rather rare condition which resulted from a contraction of the blood-vessels in consequence of a change in the action of their vaso-motor nerves. This could usually be traced to some source of irritation, as in the pelvic, gastric, genito-urinary, or other zones.

Again, electro-muscular excitability is diminished in general passive spinal congestion, but not so or to the same degree as in vaso-motor anæmias of the same regions. There were various other points, a consideration of which would aid in settling positively whether we had to deal with anæmia or cases of passive congestion.

As regards frequency, he remarked that spastic contraction of the blood-vessels of the spinal cord, continuing for a great length of time, was a rather rare phenomenon; but as to congestion it was not an uncommon thing for it to occur and to continue for a long time. He spoke of cases of so-called spinal irritation supposed to be due to spinal anæmia. These he had been led by observation to divide into two sections; one belonged with those cases of pachymeningitis and other diseases of the envelopes of the cord in which there was not simply hyperalgia, but actual soreness and not simply tenderness and pain. These cases were frequently considered as instances of spinal irritation. Besides these there was another class in which certain zones of the cord became greatly exhausted, there being in these zones a loss of balance between the processes of waste and repair, until the structure of the cord became worn and irritable—hyperalgie,—so that slight sensory impressions entering the affected regions were interpreted as being severe. The pain was not due to inflammation of the cord, or congestion, or anæmia of the cord; it was a matter of nutrition. For example, a diseased spinal pelvic zone might arise from irritative disease of the pelvic organs; in the gastric zone the spinal disorder might be due to gastric catarrh; and so on, where any part of the cord had been greatly over-used in nutrition or irritated by peripheral disease, it became unbalanced in nutrition, and one of the early results was pain. This was what happened in cases of true spinal irritation, but they were not necessarily due, in his judgment, either to anæmia or congestion of the cord.

Dr. HAMMOND remarked that it was rather singular, in view of what had been said, that Dr. Jewell, living in Chicago, should see only cases of spinal congestion, and he, living in New York, on the sea level, should see only cases of spinal anæmia. He thought that Dr. Jewell's remarks were based upon transcendental pathology, and that his argument was begging the question altogether. Because Dr. Jewell's patients got better under the use of strychnia, therefore, it was concluded by him that they were suffering from congestion. Dr. Hammond gave strychnia to patients who improved under its use, and he considered them examples of anæmia. He was glad to hear Dr. Jewell admit that cases of spinal anæmia got better in the recumbent posture. He thought that Dr. Jewell's remarks proved just exactly the opposite of what he thought they did.

Dr. SEGUIN remarked that the subject was one of great impor-

tance, and his excuse for prolonging the discussion was that he had very firm convictions in regard to anæmia and hyperæmia of the spinal cord, and the possibility of making a diagnosis between them, and the therapeutics of this class of cases. It was, perhaps, because he had tried to study the disease of the nervous system from an anatomical standpoint, rather than through therapeutical and physiological views, that he had felt opposed to the accepted ideas in regard to anæmia and hyperæmia. With regard to the brain, he thought there were rare cases of hyperæmia and anæmia, but as for the cord, he considered the conditions of hyperæmia and anæmia as purely hypothetical, for he knew of no tangible evidence to support such views. He knew of none but clinical and therapeutical phenomena to prove the existence of such conditions, and he regarded Dr. Jewell's argument as nothing more or less than begging the question. There was no solid foundation for the doctrines of spinal anæmia and hyperæmia as there was for locomotor ataxia, myelitis, and various other forms of spinal disease. He thought the whole modern doctrine of inflammation was opposed to hyperæmia being a cause of inflammatory action. Probably a more important factor was the condition of morbid activity of cells. With respect to the spinal cord, the researches in pathological anatomy had not shown any basis for hyperæmia being considered the first step in myelitis. Cases could be divided into three *post-mortem* categories: First, those in which the ganglion cells and fibres were primarily affected. Second, those in which the connective tissue was involved primarily; and, third, degenerative myelitis. But in any of these he would defy any pathological anatomist to point to hyperæmia as an important factor. In his specimens there were no evidences of hyperæmia; all the changes were tissue changes from first to last, and there was no tangible evidence of increased vascularity. Within two or three years several specimens had been shown to the Association which would bear him out in this statement. The specimens obtained from Dr. Webber's case, as well as his own, did not justify one in believing that there was hyperæmia of the spinal cord previous to the inflammatory action. With reference to the practical observations of Dr. Jewell's, he agreed. He would suggest that the term subacute myelitis be altered to subacute *diffused* myelitis. In the cases of myelitis transversa, it made no difference whether acute or subacute. Strychnia, produced tonic spasms in the paralyzed limbs, whereas in the diffused forms of myelitis he had experimented with this drug

apparently with the best results. During the past spring he had a case of extensive diffused myelitis following anal diphtheria, in which he administered strychnia early with the best effects. He was prepared, if a case of acute diffused myelitis came under his treatment, to give strychnia a little more heroically than before having heard Dr. Jewell's remarks. He agreed with the author of the paper as to the beneficial effects of massage and rest.

Dr. GRAY remarked that he understood Dr. Jewell to advocate the use of strychnia in cases advanced beyond the commencing stage, or, in other words, that its use was not to be limited to the early stage.

Dr. JEWELL said that in his own practice he had not only used strychnia in the early stages, but most of all in the later stages, after the acute symptoms had passed away.

Dr. GRAY remarked that he had tried strychnia faithfully in two cases of what might be called transverse myelitis, and had obtained the physiological effect of the drug without deriving any benefit whatever from its use, both cases having lasted five or six months. He did not know but that the point to which Dr. Seguin had called attention would explain this.

Dr. SPITZKA said that he had always held the same view in regard to this question hypothetically, but had not called attention to it, for he thought that few things could be better demonstrated than that the treatment of transverse myelitis must be different from that of diffused myelitis. He had felt somewhat embarrassed by the theoretical view of Dr. Jewell that hyperæmia was an initial factor in inflammation.

Dr. JEWELL remarked that he supposed that he owed it to himself, that he had been misunderstood. He had not been talking of how congestions arose, but of congestions. Dr. Hammond had misconceived his remarks. He agreed with Dr. Seguin in regard to hyperæmia not preceding inflammatory action. He had not the slightest doubt but that a process of irritative molecular change antedated the active congestion of inflammation. He believed strychnia acted, not upon the blood-vessels, but upon the nerve tissue. As to the far-reaching scepticism of his friend, Dr. Seguin, in regard to anæmia and hyperæmia, it appeared to him his friend apparently believed in nothing in medicine except what he could see, smell, feel, or physically demonstrate. He partially shared this feeling, but, though he admired caution, he was not in sympathy with such a general nihilistic movement against theorizing in medicine, for he thought that when we saw certain evi-

dences which were not to be appreciated wholly by the senses, we could at times step out, not into the dark, but, guided by the hand of rational inference, into the light of new knowledge.

The next paper was by Dr. F. J. Morton, of New York, upon "A new current of induced electricity."

Remarks.

Dr. BIRDSALL thought that it was unfortunate that Dr. Morton had chosen the terms which he had to designate his current. He referred in one case to it as a faradic current, and again as a static induced current. Since Faraday's time an induced current had always been considered as flowing in the opposite direction to the inducing current, and occurred only when the current was closed; it was the reverse when it was opened. He did not understand that this was the case with Dr. Morton's current. Though in truth it was in one sense an induced current, yet as Faraday had attached the term induction to a different phenomenon, he thought it was improper to use it in any other sense, as it would lead to a confusion of terms.

Dr GRAY remarked that the point in the paper which had interested him more particularly, was that in regard to its practical value. He would like to ask whether the pain produced by the new current was much less than that of the ordinary faradic current. If so, it would be of great value in the treatment of children.

Dr. MORTON thought that Dr. Gray had suggested the pith of the whole matter, viz., whether the new current could be made of any important use. One difficulty was to be found in the machine. Even if machines were made that could be operated at all times, their construction was of such a nature that they were not portable. However, the current was of so much use, he believed that many would have these machines placed in their offices. As to the painfulness of the current, this was a matter merely of comparison. The softness and agreeableness of any induction current would depend upon the extreme fineness of the wires. This electricity was of so high a tension, that it was very soft, unless interrupted. If the sponges were well wet with it, a contraction could be obtained, such as would be produced with a strong induced current. He had found in his office practice that children bore the current well.

Dr ROCKWELL confessed that he was a little astonished that the question could be brought up in regard to the comparative merits of static electricity and faradic electricity. In regard to pain, he had learned from practice that the faradic current was not at all painful. He could produce contraction of every muscle of the body with a faradic current, without the slightest sense of pain. It was exceedingly pleasant ; not disagreeable. In regard to the therapeutic value of the two currents, he considered it was impossible for one to testify unless he had used both currents thoroughly. The static electrical current was one which could not be utilized extensively.

Dr. MORTON remarked, that he would add a word, simply in defense of the name. The current was as much of an induction current as any faradic induction current, being simply an electric influence set up by a conductor through space, by the presence of an active source, either of mechanisms, galvanic current, or other sources. It did not make any difference what kind of electricity was used ; it mattered not what was its source. For the purpose of illustration, he stated that the Leyden jar corresponded to the galvanic current, and that the electricity supplying the inside of the jar was, as a general thing, positive, and by means of induction we had on the outside, negative electricity. The induced current was only a transitory current set up through a dielectric. The sparks corresponded to the making and breaking of an ordinary induction coil, and whether the spark was long or short, as in the common coil apparatus, was due to whether the hammer struck fast or slow. He was of the opinion that the new current was very perfectly induced. As to Dr. Rockwell's criticism, the painfulness of a current depended upon its strength. We could use it so as to give absolutely no pain ; but for certain electrical reactions he believed it was found necessary to use a faradic current which gave some pain, which, however, depended upon the operator, and strength of current used, the whole matter being one of comparison.

Dr. BIRDSALL enquired if the direction of the current was the same or opposite to the inducing current.

Dr. MORTON replied, that he had not been able to tell whether the induced current corresponded to the make or break, or which occurred first, or whether it corresponded, or was opposite, to the direction of the inducing current.

Dr. BIRDSALL remarked that a truly induced current always flowed in the opposite direction from the current which induced it.

Dr. SEGUIN inquired what was the relation of the current as regards the time of its occurrence? A true faradic current occurred at the moment of the break of the inducing current.

Dr. MORTON remarked that as soon as the circuit took place there was an equalization of the electricity in the two jars and the outer tin-foil.

Dr. SEGUIN said that the faradic current occurred at the moment when the other ceased. He was of the opinion that we must distinguish two kinds of induction, viz. : induction in general, and the induction of Faraday, which occurred at the moment of cessation, or at the instant of the appearance of the current in the inducing circuit.

Dr. MORTON remarked that there was constantly an alteration in the direction of the currents, but that in batteries now in use the current took place only in one direction, being so constructed for convenience. In the new current we had alternating currents of even strength, and in this respect it differed from the ordinary faradic current, in being more perfect.

Dr. GRADLE, of Chicago, remarked that the discharge was independent of the charging of the jar, for when these were once charged, they would discharge as soon as the connection was made. There was a constant accumulation of electricity upon the inner coat, and a separation upon the outer coat, the constancy only being interrupted by discharges when the tension became high enough to overcome the resistance inter-opposed. He was of the opinion that the new current was not induced.

Dr. MORTON said that he would agree with Dr. Gradle, if in the case of the production of his current there was only a discharge corresponding to that of an ordinary Leyden jar; but the discharge was not the same as that of an ordinary Leyden jar; it was a true current, for it had different potentialities.

There being no further discussion, Dr. G. M. Hammond, of New York, read a paper, entitled, "The hypothetical auditory tract, in the light of recent anatomical observations."

At a meeting of the New York Neurological Society, on February 1st, of this year, the author had read a paper describing and giving the measurements of certain gigantic nerve cells discovered by him, and showed by comparison that these cells were larger as far as the carnivora were concerned, than any of the giant cells described by Betz. From the brain of the same cat in which he discovered the giant cells before mentioned, he mounted some

one hundred and fifty sections cut transversely to the cerebral axis, and including that portion of the brain between the lower olivary altitude and the optic lobes of the corpora quadrigemina. These sections enabled him to make a thorough study and examination of the cells contained in the optic lobes, nucleus tegmenti, and auditory nucleus. These cells were not a new discovery. They were known to Meynert, and their dimensions in the human brain had been given by him ; but the author of the paper was not aware of any one having given any comparative measurements of the cells. The author gave the measurements and descriptions of the cells, of the optic lobes, nucleus tegmenti, and auditory nucleus, from sections taken from the same brain, and compared them with the cells of the cortical group discovered by him. A microscopical demonstration of these cells was afforded the members of the Association. These three groups of cells followed the same law of progress as the sensory cells, that is, where there was an increase in the number of cells in the lower groups there was also an increase in the higher ones, and this increase in the higher groups was greater in proportion to that in the lower. For example, just as there was a progress in the development of cells of the anterior spinal cornu in the frog as contrasted with the proteans, so there was a still greater increase in the reticular field in the lower mammalia as contrasted with the reptiles and amphibians, and a still more rapid stride in the higher mammalia over the lower mammalia, in whom these cortical cell-groups were really absent. This anatomical fact was in parallelism with the physiological observation that the simple reflex acts were the common property of all animals, low and high ; that progress in functions was first manifested in the development of coördinated reflexes, which, in their turn, were merely stepping-stones for the highest nervous combinations of psychical life.

Remarks.

Dr. SEGUIN wished to call attention to the pathological findings in an interesting case of aphasia published in the *Archives of Medicine*, April, 1881. This case was that of the late Dr. Allin, whose aphasia was characterized chiefly by word-deafness, and who had no appreciable paralysis. The autopsy revealed a patch of softening destroying the inferior parietal lobule, a region which in many respects was identical with the cortical areas which Ferrier's and Munk's experiments had shown to be intimately con-

nected with the functions of hearing and sight in monkeys and dogs. He believed this case might serve as a clinical and pathological support of Dr. Hammond's anatomical deductions.

Dr. HAMMOND remarked that in his specimens he found a great number of cells upon the left side, while upon the right there were a very few.

Dr. SPITZKA said that he had, on the previous day, an interesting case of congenital atrophy of the cerebellum in a patient markedly ataxic, and yet his musical sense was unusually developed. And though the patient was practically an imbecile, he could repeat, after once hearing, classical operas.

The next paper was by Dr. George M. Beard, of New York, on "The medical use of statical electricity, or franklinism."

The history of franklinism in medicine had been one of tremendous expectation and tremendous disappointment. He said Berge had constructed a statical machine that would go at all seasons of the year. This was of great advantage, and would enable him to test whether there were or were not cases in which this form of electricity would be superior to either faradism or galvanism. The question was not whether this form of electricity produced a sedative or tonic effect. That had been determined a hundred and fifty years ago. The question was whether the sedative and tonic effects differed from those of faradism or galvanism. This question had not been answered. The publication of cases treated by statical electricity proved nothing except when compared with the effects produced by other forms of electricity. We could not say that franklinism was superior to faradism or galvanism unless we had used the others, and thereby derived a standard of comparison. We were now in a position to settle the question, though it would not be found an easy thing to do, and would take a long time. He stated that he was using franklinism every day with his patients. The current of Dr. Morton was, he thought, incorrectly named. It was induced, but all the phenomena of static electricity were phenomena of induction. The current from the outside of the jars was really secondary static electricity, and he thought this would be the proper name by which to designate it. It produced muscular contractions; it was milder and easier of application.

Remarks.

Dr. ROCKWELL, some four or five years ago, had experimented with statical electricity, and had drawn certain conclusions from

his experience. At the beginning of its recent revival he had procured a new machine, but as yet he had no reason to change the opinion formed some years ago. He did not care to be destructive in criticism, therefore he would say that the absolute value of statical electricity was very great; but in comparing it with other forms, its range of usefulness was inferior, and far inferior to the two forms of dynamic electricity combined. In electricity, as in medicine, benefit was often derived from a change. We know that when a certain tonic had been given for a considerable length of time, the patient improved if it was changed for some other tonic, though it was known to be inferior to the first. Therefore, for this reason, he would recommend its use. He quite agreed with Dr. Beard in the choice of galvanism first, faradism next, franklinism last, but, preferably, all three.

Dr. AMIDON said that what little experience he had, while with Dr. Charcot, in Paris, led him to agree with Dr. Beard. Most commonly the good effects of statical electricity were due to mental impressions. The best results which had been obtained in Charcot's practice were in cases of hystero-epilepsy. Drs. Charcot and Vigouroux claimed that only in this way was it superior to galvanism and faradism. They used it in a variety of cases and on a large scale; they would huddle together upon a single isolated stool cases of hystero-epilepsy, locomotor ataxia, paralysis agitans, a case of anæsthesia, and a case of headache, thus forming a series of pathological conditions which had nothing in common, and apply the same current to all of them. He considered this wholesale way of dealing with patients not advisable, and that it was adopted only as a means of saving time. He had noticed that when Dr. Vigouroux had a case of infantile paralysis he took it to the galvanic machine and applied the current with great care. Dr. Onimus, one of the best electricians in Europe, never used static electricity. He had watched the application of static electricity, had taken histories of cases, and with the exception of temporary relief in hysterical patients, he had never seen any benefit derived from its use.

Dr. BIRDSALL remarked that he observed that Dr. Beard held partially to the view that while the general term induction was applicable to Dr. Morton's current, the term was not well taken. He thought we should be exact in regard to the use of our terms in these matters. The name given by Faraday should be maintained as describing a particular condition. He would state again that he considered, as Faraday had considered, a current in a conduc-

tor to be an induced current, when it was produced by another current or magnet at the moment when the circuit was made and broken, and that the current ordinarily passed in the opposite direction from the inducing current. In regard to its uses he could confirm to a slight extent Dr. Amidon's statement.

Dr. MORTON thought that Dr. Amidon took rather a humorous view of Dr. Charcot's use of static electricity. Charcot and his associate Dr. Vigouroux had to administer to the wants of a large number of patients, and he saw no inconsistency in giving electricity in the manner described. Professor Charcot had recently written a long article, in which he had analyzed the historical position of static electricity, together with the different machines and appliances which had been used, and then proceeded to state the class of cases in which he thought its use was of value. Hysteria was one of the diseases in which he thought it of great value. He stated that static electricity was of the greatest value in a large number of diseases.

Dr. ROCKWELL wished to ask Dr. Morton if he had ever put to a thorough test the tonic effects of general faradization in all its power.

Dr. MORTON replied that he had never used general faradization.

Dr. BEARD remarked that the question was not whether the static electricity helped to cure disease, nor was it what Charcot or Vigouroux thought of it. That question had been settled even in this country before Charcot or Vigouroux were born. The question was whether there was any comparative superiority of the two forms of electricity, and he thought this was the only thing to be considered. He thought there were a great many gentlemen in this country and in Europe who could make the comparison between the different varieties of electricity, and who knew what electricity could do, and that they would make this comparison.

There being no further discussion, Dr. Beard read a second paper giving directions "How to use the bromides."

He regarded the bromides as among the great and few remedies which we had, and that they ranked with opium, quinine, and electricity. As far as we knew, their good effects depended upon their being administered in the treatment of functional nervous diseases. What he had to say had especial reference to other diseases than epilepsy. Their use in epilepsy had been much writ-

ten upon, but it was not so well known that they were of value in the treatment of various functional nervous disturbances or diseases, though in these conditions they had proved as efficacious as in epilepsy, and far more so. In giving the bromides for the above-named conditions, the object aimed at was first to produce the effect of bromization to a greater or less degree. When the bromides were given in such small doses that they did not produce bromization, they did not accomplish much good for the patient. Bromization was an abnormal state, a disease, but in therapeutics we cured diseases by producing disease. Second, to rapidly induce bromization it was usually of advantage, though not absolutely necessary, to give immense doses, from 30 to 100 grains, more or less. Idiosyncrasies were sometimes met with, where patients were susceptible to small doses of the bromides. They should be watched for. In some cases, as in attacks of hysteria or sea-sickness, a single large dose, say 100 or 120 grains, or more, given in one or two tumblers full of water, would be sufficient, without any more, to accomplish the purpose for which they were given. To sea-sickness bromization was what vaccination was to small-pox; it absolutely prevented it in nearly every case. There was no nerve disease known to science so absolutely under medical control as sea-sickness. Third, the bromides were to be given in these immense doses, for a short time only, save, of course, in epilepsy and epileptoidal conditions—a few days, sometimes two, or three, or four, or more days. The secret of success in the use of the bromides, as with every thing else, is to know when to stop.

It was because of the want of this knowledge that we heard so much about the evil effects of the bromides. He cited cases where bromization had been produced within half an hour, and stated that it was possible to kill a person with the bromides as surely as with a pistol. In some cases bromization sprung upon one suddenly after a long delay; it did not usually creep upon the patient slowly. Fourth, the bromides, if used long or frequently on any patient, should be used alternately with tonics; this was very important and not generally known in connection with other diseases than epilepsy. Fifth, it was of advantage to use a number of the bromides in combination. The bromides which he usually used in combination were the bromide of potassium, calcium, sodium, ammonium, and lithium. He also used other bromides such as the bromide of camphor, zinc, and iron. Sixth, some nervous patients, who were not epileptic or epileptoidal, needed to

use the bromides for a time, just as though they had epilepsy, subject to the directions above given. There was such a thing as the habit of taking the bromides.

Remarks.

Dr. HAMMOND enquired if Dr. Beard attributed the effects to the bases, or to the bromine. He said that he had been somewhat struck with the idea that the same effect, in epilepsy, could be obtained from thirty grains of a salt, three times a day. He was inclined to think that the bromide condition was a modified condition of scurvy; he had been giving the pure bromine in drop doses, and had obtained the same effect upon the epileptic phenomena, but without giving rise to scurvy. He simply mentioned it as a point needing investigation. So far as the influences which particular bromides had, he did not see any particular difference between them, or any advantage in combining them. He almost invariably administered bromide of sodium because it was more pleasant to the taste.

Dr. GRAY remarked that there was one source of fallacy in getting at the effects of the bromides, which was almost universally overlooked, viz., that these effects were generally estimated from their use in cases of epilepsy. After having given one of the bromides until its good effects had ceased to be manifest, as, for instance, with the bromide of potassium, if it were stopped, and the bromide of sodium were given instead, good effects would follow its administration, and after this failed to act, if the patient was put upon the bromide of ammonium he would improve. Not only so, if their administration were stopped altogether, the patient would get better, or if he was put upon almost any other remedy, or if they became the subjects of an injury, and were confined to the bed, they did not have epileptic seizures for a long time at least. A tap on the head would also, sometimes, stop epileptic convulsions for a few days. Hence, one in an enthusiastic frame of mind might attribute undue therapeutic value to some particular bromide or plan of treatment, when, in reality, epileptics improved upon almost every new remedy which was administered to them.

Dr. SEGUIN rose to protest against the comparison of bromization to scurvy. He had a very clear picture in his mind of the latter condition. He had seen a shipload of scorbutic sailors with multiple hemorrhages, some of them as large as a hand,

without any nervous symptoms. The tendency to hemorrhage was characteristic of scorbutus, not so in the case of bromides. Their administration was followed by loss of power. In regard to Dr. Hammond's question, he thought he had answered that in a series of experiments which he performed while in charge of the hospital for epileptics on Blackwell's Island, in 1874. He tested the comparative value of the chloride of potassium, and the bromide of potassium, with the following results: Three male patients one month under KBr, 22 attacks; under KCl, 115 attacks. Eighteen female patients, one month under KBr, 205 attacks; one month under KCl, 410 attacks.

Again, thirteen female epileptics under KBr, average monthly number of attacks in a period of three months, 70 attacks; the same, one month under KCl, 348 attacks.

These results were published in the *New York Medical Journal*, April, 1878. He had come to the conclusion that the efficient agent was bromine, and not potassium. Upon most points as regards administration he agreed with Dr. Beard.

Dr. HAMMOND wished to give the Association the formula which he used, which was one drachm of bromine to eight ounces of water. Of this he gave a teaspoonful, properly diluted, three times a day.

Dr. JEWELL remarked that he had had a somewhat similar experience in regard to the use of bromine, and merely rose to declare it. He thought some patients would bear the bromine, when they could not take it in connection with the alkaline base. He noticed this particularly in one patient who had been taking the bromides constantly, he believed, under the direction of one physician or another for thirteen years, and who was obliged to abandon them entirely on account of their bringing out immense sores, especially upon the legs. This same patient had been using bromine alone for a considerable while without any return of the disorder spoken of.

Dr. SEGUIN considered Dr. Jewell's observation a very valuable one. A recent patient of his had an eruption produced upon her legs in a few days by moderate doses of the bromide of potassium. The same condition was caused by mixture of chloral and bromide. He had placed this patient now upon bromide of camphor, which controlled the epileptic fits without giving rise to cutaneous lesions. He wished to inquire if this eruption had been noticed principally upon the lower members.

Dr. JEWELL remarked that the eruption in his case was found

upon the legs from the knee down, and also on the face, in the distribution of the trigeminus, in which location it was very bad.

There being no further discussion, upon motion of Dr. Hammond, the Association adjourned.

Third day, afternoon session.

The Association was called to order by President Bartholow, at 2.30 P. M.

Present.—Drs. Amidon, Bartholow, Beard, Birdsall, Gradle, Hammond W. A., Hammond G. M., Jewell, McBride, Miles, Morton, Rockwell, Seguin, and Spitzka.

The Secretary read the minutes of the previous session, which were approved.

The Council recommended the acceptance of the resignation of Dr. Cross.

Upon motion of Dr. Spitzka, the resignation of Dr. T. M. B. Cross was accepted by the Association.

The Secretary announced the receipt of excuses for absence from Drs. Eads and Putnam, of Boston.

The amendment to the constitution offered by Dr. Gray, upon motion of Dr. Hammond, was deferred for action, in consequence of the absence of its author.

The first paper was by Dr. Wm. A. Hammond, of New York, entitled, "Nerve-stretching in locomotor ataxia."

His paper consisted of an enumeration of the published accounts of cases in which the operation had been performed, together with the history of the cases in which he had operated. His practice had been to expose the sciatic nerve on the posterior part of the thigh at about the junction of the upper with the middle third, and, introducing his little finger, pull alternately up and down, until the nerve had been stretched about an inch or less, when it was returned to its bed and the wound dressed antiseptically. He was led, by the favorable results attained in his three cases, to the opinion, that the operation might prove of decided value.

Remarks.

Dr. JEWELL reported that he had recently received information by letter from a well-known physician of the successful

performance of the operation in two cases in which it afforded marked relief. The history of these cases was unpublished, so far as he knew, and they should be added to those in which the operation had been performed with benefit.

Dr. SPITZKA, without wishing to adopt the opinion of the author of the paper on European operations, considered the amelioration of pain following the operation no positive evidence that it was in consequence of the operation. The case of a physician in the U. S. army had recently come to his notice, in whom such remarkable symptoms were caused by the taking of morphine that the diagnosis from posterior sclerosis of the cord was exceedingly obscure. He had, however, unquestionable disease of the spinal cord. The suspension of the morphine caused a sudden cessation of the pain. The same claim had been made for static electricity in ataxia that was now made for this operation, and until the proof was more conclusive than at present he thought we had better reserve our opinion as to the curative or beneficial effects of the operation.

Dr. BIRDSALL referred to Dr. Westphal's case, and said that in that instance no lesion of the spinal cord was found, and that during life a good deal of doubt was expressed as to whether it was a case of locomotor ataxia. There was no degeneration of the posterior columns, and the history given by Dr. Langenbeck was exceedingly meagre. He stated that the disease developed within a few months, and that at the time of the operation the patient had ataxic symptoms in the upper and lower extremities. He did not describe the nature of the disease. As to the existence of pains and the absence of the tendon reflex before there was any change in the spinal cord, he considered it a doubtful point, and one that could hardly be credited. He might, perhaps, refer to a case mentioned by Dr. Seguin in a published paper. In this case there was pain and absence of tendon reflexes for 30 years, without any ataxic symptoms being manifest. Dr. Birdsall did not mean to say that doubt should be thrown upon all these cases, but probably a great many cases would be met with that would not be carefully examined, and a diagnosis not carefully made. In a certain number of cases the symptoms to which Westphal referred were acute and disappeared rapidly. In regard to the effect of nerve-stretching, the experiments of Brown-Séquard in stretching the nerves of animals were probably familiar to the members of the Association. The general view which was gaining ground, that the effect of stretching a nerve did influence the

central nervous system, at least temporarily, was one that was deserving of a good deal of consideration; but he judged that the effects were to a great extent temporary, and perhaps would be followed by bad ones, as happened in Westphal's case.

Dr. SEGUIN remarked that it had always seemed to him that sclerosis of the posterior columns was characterized by periods of amelioration, and he agreed with Dr. Spitzka that the subsidence of pains after the operation was not conclusive that it was due to the operation. He had frequently known the pains of sclerosis to be apparently arrested by treatment, and sometimes without any treatment whatever; and from what we know of the disturbing effects of operations upon the central nervous system, it might be that the operation, as an operation, might explain the subsidence of the symptoms. It was known that the operation of removal of the testicle was at one time a favorable remedy for epilepsy, and it no doubt did suspend the attacks for a time. He had no prejudices against the operation of nerve-stretching and might try it, but before doing so he should hardly be led to expect much permanent benefit. He was of this opinion, perhaps, because he believed that the changes in the posterior columns were grave and incurable. In the case referred to by Dr. Birdsall the patient had had pains for 30 years, and he found marked sclerosis in the external part of the posterior columns. He had examined the cord of another patient, that of a man, who for two years suffered from numbness in his legs and arms. The patient died of acute anæmia. There was no ataxia. Before dying he experienced sharp pains in one heel. After the death of the patient Dr. Seguin learned that he had experienced sharp pain in one thigh during the preceding summer while at a water cure; these were the only pains that the patient had had in a two years' illness.

Post-mortem examination showed typical sclerosis of the external part of the posterior columns. He had had an opportunity some two years ago of examining a sciatic nerve stretched by Dr. Weir for tetanus, and he found very few nerve fibres in a state of degeneration. There was marked perineuritis at the seat of handling, but the inflammation did not seem to proceed very far within the bundle of the nerve, and he was quite surprised at the comparatively healthy condition of the nerve.

Dr. AMIDON called attention to the fact that in Dr. Weir's case, besides stretching, the nerve was taken upon the curved side of a director and rubbed. He enquired if Dr. Hammond considered the effects due to any thing further than several counter-irritations.

Dr. HAMMOND remarked that he most certainly did. He thought those who first saw a case of tetanus, and made a *post-mortem* examination, would not be disposed to think the disease due to a slight cut in the thumb, but where we know that such slight injuries as this might give rise to so grave a disease as tetanus, he did not think it impossible for nerve-stretching to benefit locomotor ataxia.

Dr. ROCKWELL had no doubt that relief of pain in locomotor ataxia might be brought about by various methods of treatment. He thought, however, that in many of the cases coming from German sources functional disease had been mistaken for organic.

Dr. MORTON had no doubt but that various measures would relieve the pains of locomotor ataxia, and from the experience which he had had in one case with static electricity, he would say that ataxia and pains had disappeared. In reporting this case he had been incorrectly understood as stating that he had cured a case of locomotor ataxia, whereas he simply said that the pains and ataxia were relieved by the treatment. He did not consider it an instance of remission, for it would be strange if the remission should occur just at the moment of treatment, especially when the pains had existed for a long time. In reviewing the observations of Dr. Hammond, it seemed, in view of the amelioration and improvement immediately following the operation, that it was worthy of consideration, especially inasmuch as the operation was extremely simple. He performed the same operation in the case of a patient having lateral sclerosis, cutting down upon the sciatic nerve in the sciatic notch. In this locality he found it a little more difficult than it would be at the point recommended by Dr. Hammond on account of the depth of the nerve. He raised the nerve with his finger, and stretched it vigorously. In the stretching he would avoid the use of instruments. He stretched it until he could feel something give way, and then returned the nerve, and sewed up the wound. The patient wrote that he was immensely better ; he walked better. He considered the operation extremely simple, and, in view of this fact, he would stretch as many sciatic nerves for locomotor ataxia as he could get patients who would allow him to do it.

Dr. HAMMOND remarked that some recent experiments had showed the sciatic nerve capable of sustaining a weight of seventy pounds. He spoke of the undue stretching which had been practised in some cases, which in one instance was so ex-

treme that the nerve lay as a loop upon the thigh, having been stretched two or three inches.

Dr. G. M. HAMMOND called attention to a case which had been operated upon by Dr. W. A. Hammond, at the college clinic, and in which the symptoms had been aggravated.

Dr. SPITZKA enquired if the girdle sensation was relieved.

Dr. HAMMOND replied, that in one of his cases the girdle sensation was not relieved. In the other cases there had been none of it at any time, but the bladder symptoms were very much improved, and the tendon reflexes slightly restored.

Dr. BIRDSALL remarked that in a case referred to by him the girdling sensation was not improved, though the symptoms in regard to walking were.

Dr. GRADLE, of Chicago, reported a case of "Spasm of the ciliary muscle of central origin." A young healthy lady suffered from an attack of left hemiplegia during a protracted labor. Both the positive and negative symptoms pointed to a small hemorrhage in the vicinity of the right internal capsule. The motion returned soon in the face and lower extremity, but there persisted a paresis of the arm and paralysis of its extensor muscles. Shortly after attack the patient complained of hazy sight, which trouble did not change in the course of six months. Upon examination there was found an apparent myopia of both eyes, amounting to 1.5 dioptries. Both eyes were healthy. The myopia was measured with identical result with the ophthalmoscope, but changed to emmetropia on instillation of atropine. The spasm, however, returned after the effect of the atropine had passed off. Very dilute solutions of this alkaloid removed the contracture of the ciliary muscle temporarily, without interfering to an annoying extent with the accommodation.

Remarks.

Dr. SEGUIN remarked that Charcot had called attention to monocular amblyopia in cases of hemiplegia, and he thought that there was no evidence to show that these cases had been carefully examined for errors of refraction, and hence we could not say that they were unlike Dr. Gradle's case. Dr. Seguin had a case of apparent monocular amblyopia, with paralysis upon the right side. He sent the patient to the Manhattan Eye and Ear Hospital, for examination by one of the staff, and it was found that the amblyopia upon the paralyzed side was due to hypermetropia, which must have been an original defect.

Dr. SPITZKA remarked that it had been observed, in general paralysis of the insane, in which the lesions were diffused, that the patients within a short period changed the size of written letters. For instance, they would write letters three-fourths of an inch in height on one day, and the following day, and for months afterward, they would write letters of less than a millimeter in height. It might not be impossible that a condition similar to that described by Gradle might obtain in such cases. These patients were not usually examined carefully. He thought the question introduced by Dr. Seguin was not one that should be confounded with the one under discussion. It seemed to have been referred by its discoverer to a different mechanism entirely.

Dr. JEWELL would simply say that the case reported in the paper was one that had interested him very much, and that as Dr. Gradle had been kind enough to ask his opinion in regard to presenting such a paper to the Association, he had given it as his judgment that it was perfectly suitable, and he wished to say before he sat down (for it was one of his purposes in rising at this time), that it seemed to him that not enough care was likely to be taken in the examinations of ocular manifestations by those who cultivated neurological science. He thought they took place many times unnoticed. He thought it was necessary to investigate the states of the special senses. He had observed, for example, many peculiar phenomena in regard to the color-sense of cerebral origin.

The next paper was by Dr. W. R. Birdsall, describing "A new foot dynamometer."

The instrument described consisted of a base-board eighteen inches by six inches, in which were mortised two upright supports for an iron rod, which formed an axis on which the foot-board turned. Three grooves were cut in the base-board at one end, and corresponding grooves in the under surface of the foot-board, on to which slipped the ordinary elliptical spring dynamometer used for testing the grasp. An adjustable long gauge slid on the upper surface of the foot-board for the purpose of giving a definite position for the foot. In order to fasten the foot firmly to the board, and furnish a point for traction, a broad toe-strap was used when the anterior tibial group of muscles was to be tested, and a narrow heel-strap for testing the posterior group. The method of recording the observations made by means of this apparatus was also explained.

Remarks.

Dr. G. M. HAMMOND gave a blackboard illustration of an instrument which he had invented for the same purpose about a year previous, and which would indicate the amount of pressure in pounds, by means of a spiral spring.

Dr. MORTON remarked that he had used Dr. Hammond's instrument and with the utmost satisfaction. He thought an instrument which would indicate the actual expenditure of force preferable to one indicating only relative force.

Dr. SEGUIN thought that for comparative measurements the instrument devised by Dr. Allan McLane Hamilton was excellent. It consisted of a rubber ball to be compressed, which was connected with a graduated tube filled with colored fluid or mercury.

Dr. MILES, of Baltimore, had not been satisfied with Dr. Hamilton's instrument, except for testing sustained power, for which purpose he liked it very much.

Dr. BIRDSALL remarked that at first he thought of using a spiral spring, but, in order to reduce expense and simplify matters, conceived the idea of utilizing the ordinary hand dynamometer, which most neurologists already possessed. He could see no special advantage in indicating absolute force; but if that was thought necessary it could be done with his instrument by calculating what the force represented.

The Secretary read the following papers by title :

First, a candidate's paper, that of Dr. Burt G. Wilder, of Ithaca, N. Y., on "The Brain of a Hydrocephalous Dog (King Charles Spaniel)."

Second, a candidate's paper, that of Dr. Charles K. Mills, of Philadelphia, "Tumor of the Motor Zone of the Brain."

Third, a candidate's paper, that of Dr. Wharton Sinkler, on "Chorea in the Aged."

Fourth, a candidate's paper, that of Dr. S. V. Clevenger, of Chicago, on the "Function of the Nerve Cells."

Fifth, a member's paper, that of Dr. J. J. Putnam, of Boston, "A Preliminary Notice of an Investigation into the Earlier and Obscure Symptoms of Lead Poisoning."

Sixth, the paper of Dr. E. C. Seguin, "A Second Contribution to the Study of Localized Cerebral Lesions."

Dr. F. T. MILES, of Baltimore, next gave a verbal account of a novel case of myelitis, which he said was one of a class, and therefore interesting.

The patient was a man about 32 years of age, living in the West, in a malarious part of the country. He was seized with symptoms of what his physician called congestive fever,—symptoms of chill followed by fever,—and treated with quinine. He was to be brought to Dr. Miles, but had a relapse. He then suffered from weakness and pain in the lower limbs, as his physician called it. He insisted on continuing his occupation until he became so weak that he had one or two falls, and continued to have pains and numbness in his legs. In this condition he was sent to Baltimore, where Dr. Miles saw him in consultation. His condition was one of almost complete paralysis of the lower as well as the upper extremities, and of the face upon both sides. He could close neither eye, and this gave him a marked appearance. It was supposed that deglutition and his lungs were affected, but Dr. Miles discovered that such was not the case, except he could not grasp the food with his lips. Tongue could be protruded. No tendon reflex nor ankle clonus. There was delayed skin sensation of the soles of the feet; strong tickling of feet gave rise to an exaggerated reflex. There was decided hyperæsthesia upon slight pressure with compasses. No contraction from faradic current, except, perhaps, one or two of the muscles of the legs; none in the upper limbs or face. There was the degenerative reaction of the galvanic current. Dr Miles' prognosis was that he would recover, and he did so completely within two months. There was no bladder trouble, nor paresis of the abdominal muscles. He thought the case illustrated a new phase of myelitis. The case had a remarkable resemblance to polio-myelitis in the loss of faradic contractility and alteration of galvanic reaction. We had here an alteration of the sensitive nerves, an affection not confined, as in polio-myelitis, to the anterior horns, but invading the posterior horns, and, perhaps, the lateral columns. One thing that threw light upon the case, although the gentleman did not admit it, was that he was affected with syphilitic disease.

Dr. MILES thought we frequently saw cases where there was more or less interference with sensorial phenomena in polio-myelitis, and he was of the opinion that we could not say it was an affection which left the posterior horns unaffected.

Remarks.

President BARTHOLOW inquired as to the condition of the respiration.

Dr. MILES had not been able to make out the affection of any of the cranial nerves except the seventh ; respiration was good.

Dr. BARTHOLOW inquired as to the treatment of the case.

Dr. MILES replied that it consisted in the administration of iodide of potassium in gradually increasing doses up to twenty or twenty-five grains, three times a day, and the application of galvanism to the spine and muscles.

Dr. AMIDON inquired if there was any suspicion that the febrile attack might not have been due to a septic disease like diphtheria, and followed by paralysis, which simulated myelitis.

Dr. MILES replied that there was nothing in the history of the case upon which he could hang such a suspicion.

Dr. JEWELL remembered to have had a case, as nearly as might be, similar to Dr. Miles'. The patient was a gentleman who came walking with a couple of sticks into his office one day, and whose face was in the same condition as described by Dr. Miles, or in a day or so after became so. There was no suspicion of syphilis. He had been affected in the autumn and spring with intermittent fever. He continued to improve under treatment for four or five weeks, and went home with the idea of attending to some of his duties in the capacity of principal of a high school. Dr. Jewell told him he could safely go, if he would not undertake any work. He felt obliged to work and commenced walking up and down stairs, got a little cold, and had a return of the symptoms that he had when first taken sick. Dr. Jewell visited the patient at his home two or three times. He was improving again when he had another relapse ; the symptoms became of a very aggravated character. It was now three years since the man had been able to raise himself from a chair, having most remarkable contractions of all of the flexor muscles of the members. There was also stiffness of the muscles of the back of the neck and back, together with very great wasting of muscles. The sensory as well as the motor tracts were affected. This case passed from subacute diffuse, right along into what Dr. Jewell called acute myelitis. The man was permanently ruined in health.

Dr. SEGUIN remarked that he had upon record a case of polio-myelitis, in which the only voluntary muscles that could be moved were those of the eyes, and one of the toes, and left fingers. The face was a perfect mask, there being paralysis of the muscles on both sides. There was no difficulty in deglutition. In this case he thought there was diffuse myelitis in addition to the polio-myelitis. The pains which some of these

patients have were of two kinds. Some had neural or neuralgic pains, and since the publication of Prof. Leyden's paper¹ it had been questioned whether some of these cases of so-called polio-myelitis were not cases of disseminated neuritis. He had thought the same of this case. He had seen a case with Prof. Delafield, in which the pains were of a fulgurating character,—not neuralgic. He was led to infer from the involvement of the posterior columns that a good prognosis was not possible. He had always held that there were transitional forms between polio-myelitis and other forms, and he was prepared to see almost any grouping between simple relapsing polio-myelitis and cases like that of Dr. Miles' and Jewell's, and other cases, as in Prof. Delafield's, where there were indications of involvement of the posterior segments of the cord. What was wonderful about these cases was their curability. Dr. Jewell's case was the only one, so far as he knew, that had not been cured. All of his cases had done well.

Dr. HAMMOND said he had recorded a similar case to the one reported, but had never seen a case where the paralysis extended as high. In one reported in his book the paralysis extended as high as the neck, but the facial muscles were unaffected. The singular feature about the case was the suddenness of the development of the symptoms. Having eaten his breakfast and started down stairs he suddenly found himself unable to move. He fell down stairs, and being brought to New York, Dr. Hammond found his motor functions on the second day after the fall entirely abolished, though sensation was intact. He made a good recovery under the use of ergot and faradism. Dr. Hammond did not believe the treatment had much to do with the result, because, as Dr. Seguin had pointed out, these patients seemed to get well under any treatment.

Dr. SEGUIN inquired if he (Dr. Hammond) did not think there was any localized myelitis.

Dr. HAMMOND replied that he thought the lesion was local, and of the anterior horns, or anterior columns, because there was no perversion of the sensibility, and no paralysis of the muscles of the face.

Upon motion the Association was declared adjourned.

¹ Ueber polio-myelitis und neuritis. *Zeitschrift für Klin. Medicin*, 1880.

Third day, evening session.

The Association was called to order at 8.30 P.M. by the President.

Present.—Drs. Amidon, Bartholow, Beard, Birdsall, Gradle, Hammond, W. A., Hammond, G. M., Jewell, Kinnicutt, Miles, Mills, Morton, Seguin, and Spitzka.

The Secretary read the minutes of the afternoon session, which were approved.

The Council reported through Dr. Seguin that their recommendations for Honorary and Associate Membership were as follows :

Honorary Members.

Prof. J. M. Charcot, Paris ; Prof. J. Hughlings Jackson, London ; Prof. W. Erb, Leipsic ; Prof. C. Westphal, Berlin ; and Prof. Theodore Meynert, of Vienna.

These gentlemen were nominated by the following members : Bartholow, Hammond (W. A.), Jewell, Miles, McBride, Seguin, Spitzka.

Associate Members.

Dr. Thomas Stretch Dowse, London ; Dr. Moritz Bernhardt, of Berlin ; Dr. W. R. Gowers, of London ; Prof. David Ferrier, of London ; Dr. Camillo Golgi, of Pavia, Italy ; Dr. H. Charlton Bastian, of London ; Dr. J. Russell Reynolds, of London ; Dr. Obersteiner, of Vienna. Nominated by Drs. Hammond and Jewell. These gentlemen were unanimously elected.

Under the head of miscellaneous business, Dr. E. C. Spitzka moved the adoption of the following rule :

That at as early a date as possible, before the annual meeting of the Association, the members shall be informed by the Secretary of the titles of papers which are to be read at the meeting, and arranged in the order received.

Carried.

Dr. L. C. GRAY gave notice that he had submitted the following amendment to Art. IV of the Constitution at the annual meeting of 1880 :

To read that

“They be nominated by the Association at the first day of the annual meeting,” instead of “They shall be nominated by a Committee on Nomination of five members, appointed by the President on the first day of the annual meeting.”

Upon motion the amendment was adopted.

By a vote of the Association, Dr. N. B. Emerson, of Honolulu, and Dr. J. S. Lombard, of London, England, were transferred from Active to Associate Membership.

In view of further removals from the United States of Active Members, Dr. J. S. Jewell, of Chicago, gave notice that he would submit the following amendment to the Constitution at the next annual meeting :

That all Active Members of the Association who shall hereafter remove from within the limits of the United States shall thereby become Associate Members, should they so desire.

Dr. F. T. MILES, of Baltimore, presented a specimen of "Tumor of the pons." The patient, a woman, was brought into the hospital with motor paralysis of one side; on the opposite side the paralysis was not absolute. She was semi-comatose, which condition continuing for a little time, the cornea became opaque, and she died in this condition. He thought the lesion consisted of a thickening of the dura mater pressing upon the fifth and seventh pairs of nerves at about the points of decussation, but the *post-mortem* examination had proved him to be wrong, there being a tumor in the central portion of the pons. The tumor was supposed to be of syphilitic origin.

Remarks.

Dr. SPITZKA enquired if there were no vaso-motor phenomena.

Dr. MILES replied that he did not recollect of observing any. The trophic influence on the cornea was noticed.

Dr. SPITZKA asked if choked disc existed.

Dr. MILES said that, as far as it could be observed, the Gasserian ganglion was intact.

Dr. SPITZKA called attention to the distortion of the specimen by twisting.

Dr. MILES said that the twisting was in it when he found it.

Dr. SPITZKA thought if that was the case it was one of the most remarkable conditions ever known.

Dr. CHAS. K. MILLS, of Philadelphia, next proceeded to read a paper upon the same subject, entitled "Tumor of the pons Varolii, with conjugate deviation of the eyes and rotation of the head."

The case upon which this paper was founded was one that could not fail to be of great interest to the students of close local-

ization. The patient, R. C., æt. 32, single, groom, had a history of intemperance and of syphilis. He had several times fallen from horses, and had been kicked on the head. Four weeks before coming under observation he had an attack of dizziness and fell, but was not unconscious. A few days later his eyes began to trouble him, and he noticed some loss of power in his right arm and leg. On examination, he was found to be anæmic, weak, and apathetic mentally. He had right hemiparesis. Sensation was diminished on the left side of the face and in the right limbs. Hearing, smell, and taste were preserved. The most prominent symptoms, however, were a conjugate deviation of the eyes and rotation of the head to the right. He could not, by the utmost effort, bring the eyes around even to the median line. Dr. E. O. Shakespeare examined the eyes in addition to Dr. Mills. In attempted movements of the eyes to the left the right eye turned slightly, the left scarcely at all. A slight tendency to ptosis was present on the right side. The power of accommodation was not greatly impaired. The media were clear. The pupils were about normal. The ophthalmoscopic examination of the left eye showed a subacute neuritis. In consequence of the extreme deviation of the eyes to the right, the right eye could not be satisfactorily examined by the ophthalmoscope. A scar and a narrow cleft in the skull were found in the squamoso-temporal region. Two slight scars were also found in the scalp of the right parietal region. The patient was placed upon potassium iodide, and tonics, but did not improve. Persistent epistaxis set in, and was not relieved by treatment. He died of general exhaustion. Before death the face and limbs of the left side became paretic, and right-sided paralysis became more marked. The pupils became contracted, the left being a little smaller than the right. The conjugate deviation and other symptoms remained about the same.

Autopsy.—A slight cleft or fracture, without displacement or depression, was found in the inner table of the skull, corresponding to the scar and fissure in the squamoso-temporal region. The dura mater was here slightly adherent, and a hard, yellowish tumor, no larger than a pea, was present beneath the adhesion, on the inner surface of the dura. It was attached below to the pia mater also, and caused a slight depression near the middle of the first temporal convolution. On exposing the floor of the fourth ventricle, a distinct bulging of its left upper portion was observed. On making a transverse incision through this bulging mass, a small tumor was discovered in the body of the pons, both the

anterior and posterior surfaces of the latter retaining their integrity. The tumor was distinctly limited to the left upper quarter of the pons, coming close to, but not crossing, the median line. On section it was found to be of firm consistence, and of a greenish-gray color. It was examined microscopically by Drs. J. H. C. Simes and H. Formad, who concluded that it was a gumma.

Dr. MILLS concluded that the peculiar ocular symptoms present in this case were due to the tumor of the pons Varolii. Vulpian, Lockhart Clarke, Prevost, Brown-Séquard, Bastian, and others, have devoted much attention to the subject of conjugate deviation of the eyes, and rotation of the head. This lateral deviation occurs from lesions of various parts of the brain—of the cortex, centrum ovale, capsules, ganglia, crura cerebri, and pons. Ferrier, Hughlings-Jackson, and Priestly Smith, have particularly studied the question of oculo-motor monoplegias and monospasms, that is, of ocular palsies and spasms due to cortical lesions. Dr. Mills believed, with Jackson, that ocular, and indeed all other movements, are represented in the cerebral convolutions. It is necessary, however, carefully to diagnose such cases from those due to lesions at lower levels.

During the life of the patient it was a question whether we had or had not to deal with a case of oculo-motor monoplegia or monospasm from lesion of cortical centres.

Ferrier, in one of his experiments, found that irritation of a certain limited area of the surface of the brain of the monkey caused *elevation of the eyelids, dilatation of the pupils, conjugate deviation of the eyes, and turning of the head to the opposite side*. This area corresponds to a region in the brain of man, at the base of the first frontal, and extending partly into the second frontal convolution. A few cases are on record in which conjugate deviation of the eyes and rotation of the head have occurred without hemiplegia or hemiparesis. Five such cases, or rather supposed cases, have been collected by Ferrier. Some of these were probably, like the case here reported, examples of pontine lesion.

It did not seem probable that the fissured skull, and the small meningeal tumor in connection with it, had any thing to do with the production of the symptoms. The lesion was comparatively remote from the oculo-motor centres of Ferrier, at the bases of the first and second frontal convolutions. Efforts have been made to localize a centre for the levator palpebræ superioris muscle in the angular gyrus, and if such a centre could be made out to exist in this region, it is probable that centres for the other

ocular movements would be in proximity. The weight of evidence, however, both pathological and physiological, is against this localization, and the phenomena in the case under consideration are well accounted for by the pontine lesion. The tumor was also a little too far forward for the angular gyrus proper.

The case seemed to bear out the usual view with reference to the direction of conjugate deviation in pontine lesions. In such cases the deviation is away from the side of the lesion, and toward the side of the paralysis. When the lesion is of the cerebrum, the deviation is toward the side of the lesion, and away from that of the paralysis.

When the question of differential diagnosis is as to whether conjugate deviation of the eyes and rotation of the head are due to pontine or cortical lesion, the following points would seem to favor disease of the pons: The presence, at some stage of the case, of paresis or paralysis on both sides of the body; the existence of disturbances of sensation; contraction of the pupils; depressed farado-contractility; and peculiarities of temperature.

Remarks.

Dr. HAMMOND remarked that he had listened to the paper with a great deal of interest, and he would ask whether the author was familiar with the researches of Landouzy and Grasset.

Dr. MILLS replied that he was.

Dr. HAMMOND said they gave a very different interpretation to such cases.

Dr. SPITZKA, being called upon for an opinion, remarked that he could say nothing in a critical spirit, but with regard to the point just brought up, he doubted whether the cases supported the theory of Grasset. The influence would have to be more or less constant. On the contrary, we found that the ocular movements were not constantly interfered with. As in Dr. Gradle's case, all the influences exerted in the ocular movements by the cerebral hemispheres could be carried on for both eyes by one hemisphere. If the disturbance affected both eyes, there might be a cortical disturbance; but if upon one eye, a cortical lesion was entirely excluded.

Dr. MILLS remarked that he supposed the experiments referred to by Dr. Hammond had reference to the discussion of the question whether it was the first or second convolution of the angular gyrus which was the seat of the oculo-motor centre. He was in-

clined to think Dr. Spitzka's explanation was correct. The one strong practical point from his paper was the fact that we might believe that in conjugate oculo-monoplegia we must make a differential diagnosis.

Dr. MILLS also reported the following case of "Tumor of the motor zone of the brain":

The case was one seen by Dr. Mills, with Dr. F. Dercum, of Philadelphia. The patient, a married woman, aged 32 years, in September, 1878, during an attack of typhoid fever, had a severe convulsion, which left her partially paralyzed in the face and limbs of the left side for four days. In March, 1880, she had a spasmodic seizure, which began with numb sensations in the fingers of the left hand. These sensations were followed by twitchings of the fingers; a spasm soon involved the left arm; and before the attack passed off a general convulsion occurred. After the attack, the left upper extremity was found to be decidedly weaker than the right; subsequently, the patient had half a dozen similar seizures. They nearly always began with twitchings of the fingers of the left hand. The spasm was always most severe upon the left side, was usually limited to it, and was most violent in the arm. When examined early in August, 1880, the left side of the face was partially paralyzed; the left upper extremity was almost completely helpless; and the left lower extremity was paralyzed, but not quite so markedly. Her mind acted slowly. Ophthalmoscopic examination showed double optic neuritis. Hearing was defective in the right ear; she complained of torturing headache, most severe in the right frontoparietal region. Percussion above and around the ear caused greater pain than at any other region of the head. Sensibility was impaired in the left side of the face and left limbs.

She died after great suffering, August 27, 1880.

Post-mortem examination revealed a firm, nodulated tumor, having a mottled appearance on section. It was adherent to the pia mater of the convexity of the right hemisphere, and invaded the middle portion of the ascending parietal and the upper part of the inferior parietal convolutions, pushing aside the interparietal fissure. On the inner side of the tumor, the white matter of the hemisphere was broken down. No other lesion was found, except a slight adhesion of the dura to the pia mater over the upper extremities of the ascending convolutions of the left side. Microscopical examination by Dr. L. B. Hall showed that the growth was probably a carcinoma.

The position of this tumor was accurately diagnosticated during life. The spasm, beginning in the fingers of the left hand, and more marked upon the left side, and particularly in the left arm, pointed to the brachial centres of the motor zone of the cortex of the right side. The left-sided paralysis, greatest in the arm, indicated the same region of the right hemisphere. Impaired sensibility on the left side showed that the parieto-temporal, or sensory zone was probably involved either by extension of the lesion or by pressure. Localized headache, and the results of percussion, confirmed the diagnosis of the situation of the tumor.

"Atrophy of the cerebellum," by Dr. Shaw. The paper upon this subject, owing to its author's absence, was not read.

Dr. F. P. KINNICUTT, of New York, reported a case of "Chorea major," which was chiefly interesting on account of the high temperature, 103° F., and upward, thought to be dependent upon the ceaseless and violent muscular contractions, the improvement under chloral hydrate, and the tolerance of the drug by the patient, a girl of fourteen, who took from seventy to one hundred grains a day.

Remarks.

Dr. MILLS remarked that he believed the author of the paper had referred to the connection of malarial disease with the case, and it suggested itself to his mind, that the symptoms might be due to pigmentary embolism in the capillaries of the brain. He doubted if the persistent elevation of temperature noted was in consequence of the muscular action.

Dr. KINNICUTT knew that such a high temperature was not ordinarily produced by muscular action in chorea, but in his case the muscular actions were so violent that he thought the high temperature was produced by them.

Dr. JEWELL said he had seen two cases, one of which was very similar to the one reported, and in a person of the same age, and in whom it seemed to him it would have been a physical impossibility for the child to have had any more violent muscular contractions than were observed; there was no marked elevation of temperature. The muscular contractions in this instance were so severe that the patient could not be kept upon the bed, except when held by two or three individuals, and at last it was necessary to place her upon the floor. In reference to the administra-

tion of chloral to such patients he thought it should be at the hour of retiring, and in very large doses—what would ordinarily be considered almost toxic.

The next paper was by Dr. E. C. Seguin, of New York, bearing the title of "Aconitia in posterior spinal sclerosis : a new sign of its existence."

I have observed in six well-marked cases of posterior spinal sclerosis, in the first and second stages, a remarkable resistance to the action of aconitia as shown by numbness of the periphery.

These six patients took large doses of the alkaloid, from three to six tablets of $\frac{1}{100}$ grain each in a day, without numbness in the ataxic or neuralgic parts. Numbness showed itself in the parts of the body above the supposed seat of sclerosis, and several of the patients felt faint, dizzy, and quite sick from the medicine.

Dr. W. R. Birdsall, at my request, administered aconitia in full doses to several ataxic patients under his charge with substantially the same effect ; one case experienced no tingling, another case had a little numbness in toes, and a third case, after taking four doses of $\frac{1}{100}$ grain, used at intervals of three hours, felt some numbness in ends of fingers ; a few hours later was "numb all over."

It appears from these nine cases that tabetic patients are peculiarly insusceptible to the characteristic sensory symptoms of aconitia. This resistance, apparently absolute in some cases, is shown in the first stage of the disease. One of the cases which took at one time $\frac{1}{4}$ (.01) of aconitia in less than forty-eight hours, was examined *post mortem*, and the cord found sclerosed. The aconitia used in these tests was Duquesnel's crystallized aconitia, prepared by Caswell, Hazard & Co., in tablet form. The specific effects of these tablets were obtained during the same period in other cases of disease and in healthy patients. For example, in my own case, $\frac{1}{100}$ grain at 10 A.M. and at 12 noon, made me numb from head to foot, and chilly for nearly five hours.

While not now prepared to advance a theory of the manner in which sclerosis of the posterior columns prevents the sensation of tingling and numbness in tabetic patients charged with aconitia, I feel confidence in my facts, and would offer them as constituting a new negative test or symptom of the disease.

Remarks.

Dr. JEWELL wished to ask a question. The facts recited in the paper of course spoke for themselves up to a certain point, but he

wished to know if Dr. Seguin thought the disease of the sensory apparatus interfered with the action of the remedy.

Dr. SEGUIN replied that he thought so.

Dr. HAMMOND wished to ask if the author's results did not indicate that there were lesions of the gray matter of the cord of more frequent occurrence than was indicated by *post mortem* examination, for sclerosis of the posterior columns of the cord, and involving the lower segments of the cord, could not account for the phenomena in the upper portion of the body unless there were conditions which we could not find, and which this aconitia might show. He thought the experiments showed that there was a lesion the whole length of the cord.

Dr. SPITZKA wished to ask Dr. Seguin what support he had for the claim that the remedy, in acting upon the central gray matter, did not give rise to the peculiar sensory disturbances, because the sensory impressions were interfered with in going outward.

Dr. BIRDSALL remarked that in confirmation of the case reported in the paper, he would say that he had tested the effects of the medicine upon a patient not affected with a disease of this character, in whom the physiological effects of the drug were obtained in the usual time.

Dr. JEWELL remarked that if the remedy acted in the sensorium itself or in the higher parts of the sensory tract, the numbness ought to reach the consciousness of the patient the same as coming from a peripheral nerve, according to a well-known law. Do not such observations teach that either the remedy acted upon the peripheral nerves or upon their points of entrance into the gray matter of the cord, which was the seat of disease in locomotor ataxia? If it acted on more central portions of the nervous system, the impressions would be more subjective and break into the field of consciousness from other regions as well as from the diseased tracts. He asked if these observations did not throw some light upon the question as to what part of the nervous system, comprehensively considered, peripheral or central, was acted upon by the drug. If upon the peripheral, it was not difficult to understand the numbness.

Dr. SEGUIN thought the objections raised and suggestions thrown out by Drs. Spitzka and Jewell might lead to valuable results, which he thought would be in one of two ways: Either there was an unknown lesion in the gray matter in ataxia, and in that gray matter the passage of the abnormal sensation was interfered with; or, second, that the drug did not act upon the gray

matter, but upon the nerve fibres, and as these were diseased, the sensations did not arise.

Dr. SEGUIN then proceeded to read a second paper, entitled "A case of diphtheritic ataxia and paralysis from anal diphtheria—cure."

Mr. B., aged 58 years, has enjoyed good health with exception of hemorrhoids. Never any fulgurating pains, or diplopia.

Nov. 12, 1880, was operated for large hemorrhoids by injection of carbolic acid and oil. Reaction followed, with diphtheritic exudation in hæmorrhoidal masses, chill, febrile movement, and much prostration. Anus well about Thanksgiving (27th).

Early in December seemed fairly well, but a few days before Christmas legs were weak and feet numbish. Gradual increase in weakness of legs, and a few days before examination hands weak, awkward, and numbish. Bladder unaffected; no spinal or peripheral pain, or cincture feeling.

Examined January 25, 1881. Presents paresis of upper and lower extremities, with numbness and slight but distinct anæsthesia of feet, legs, and hands. The striking symptom, however, is the ataxia, which is typical both in hands and legs; no trace of patellar tendon reflex. Pupils normal. During the ensuing two weeks the paresis increased, and gradually obscured the ataxia.

Feb. 5th. Lies quite helpless on couch, almost no voluntary power in arms or legs; sensory symptoms as above. No atrophy or degeneration reaction. Improvement in voluntary power began February 15th, and progressed steadily, with corresponding diminution of the anæsthesia.

March 29th. Walks with a cane.

May 3d. Is practically cured; only remains of attack is a slight occasional numbness in soles of feet; no tendon reflex.

May 17th. A trace of patellar tendon reflex on both sides.

The treatment consisted at first in the use of belladonna and ergot; later nux vomica and iron: At the last a simple solution of strychnia in nitro-muriatic acid, was given.

A thorough electrical treatment and massage were also had. Until March 16th galvanism was used only; stabile ascending current to limbs and spine. After this date faradism was carefully used on the recovering muscles. The massage was made proportionate to the paralysis, and in the last few weeks was vigorously done.

Remarks.

Dr. MILES had seen a most complete case of ataxia about six years previous in a child three or four years old. He had had an attack of diphtheria, and from the first there was paralysis or paresis. The paresis disappeared, but the ataxia remained. Electro-contractility was somewhat diminished. The knee-jerk was not tested, for he was not then familiar with it. The patient recovered in three months under the use of strychnia and faradism.

Dr. SPITZKA remarked that there was one interesting point in a case of the kind reported, and that was the location of the diphtheritic sore.

Dr. SEGUIN said he looked upon the case reported by him as one of myelitis, probably infectious, with deposits of minute organisms around all the anterior and posterior nerve roots entering the spinal cord, probably first in the posterior segments of the cord, and the anterior afterward, judging from the succession of events. He had been much interested in the case because of the difficulty of diagnosis. Dr. Seguin was strengthened in his suspicion of diphtheria from the absence of pupillary symptoms and fulgurating pains.

There being no further discussion, Dr. Jewell moved that the designation of the place and time of holding the next annual meeting be referred to the Council for action. Carried.

The President then declared the Association adjourned *sine die*.

Reviews and Bibliographical Notices.

Lectures on diseases of the nervous system, especially in women. By S. WEIR MITCHELL, M.D. With five plates. Philadelphia: Henry C. Lea's Son & Co, 1881.

Dr. Weir Mitchell has published in this little volume, under the form of a series of clinical lectures, a number of interesting papers upon some of the nervous maladies that especially, but not exclusively, affect the female sex, which have not received general detailed attention from medical writers. Several of the lectures cover observations that are altogether or in large part new in medical literature; others are clinical studies of fairly well-known disorders, but which are here presented in the light of numerous original and interesting observations. Dr. Mitchell's large clinical experience with this class of diseases, and his well-known ability as an acute and critical observer, give to his statements a force and apparent value that would be wanting in a work by a less distinguished author. There can be no doubt as to his eminent fitness to produce such a work, the only question is, does the volume fully bear out the author's well-deserved reputation? We must admit a slight amount of disappointment at first in the examination of the work, which, however, seems hardly justified in a closer perusal. It is simply a collection of clinical essays on certain manifestations or phases of nervous disease, and not an elaborate and consecutive treatise; and so far as it has aimed it has fairly hit the mark. The subjects treated are of interest, and are handled by one who has had opportunities for observation such as very few are favored with; and while the cases reported are not so remarkable as occur in the practice of so prominent a specialist in nervous disorders, they are such as only rarely come within the experience of the general practitioner. Yet they are liable to be met with at any time, and the perusal of a work like this will do much to prepare him for their recognition.

The subjects discussed are, in the order in which they occur in the book: The Paralysis of Hysteria, Hysterical Motor Ataxia, Hysterical Paresis, Mimicry of Disease, Unusual Forms of Spasmodic Affections in Women, Tremor, Chronic Spasms, Chorea of Childhood, Habit Chorea, Disorders of Sleep in Nervous or Hysterical Persons, Vaso-motor and Respiratory Disorders in the Nervous or Hysterical, Hysterical Aphonia, Gastro-Intestinal Disorders of Hysteria, and the Treatment of Obstinate Cases of Nervous Exhaustion and Hysteria by Seclusion, Rest, Massage, Electricity, and Full Feeding. The majority of these chapters are simply clinical lectures upon rare or peculiar phases of nervous disease of the so-called functional varieties. While very interesting and profitable reading, they do not for the most part require detailed notice here. Some of the subjects have been discussed perhaps more exhaustively by other writers, such as the hysterical aphonias and paralyzes, but many of the observations here recorded are absolutely new and of especial value on that account. The chapter on chorea of childhood is an interesting study of the relations of chorea to race, climate, season, etc., and is illustrated by several tables and diagrams which are inserted in a rather unusual place,—the beginning of the volume. Dr. Mitchell finds that the weight of evidence is in favor of the view that chorea is less prevalent in country districts than in large towns, that there is a less liability to it in the negro than in the white race, that the spring is the season of the year in which it is most liable to occur or recur, and that there is an apparent relation between the condition of the weather and the prevalence of the disease. He divides the disorder into three varieties as follows:

“Group first.—The common type; awkwardness and incoördination of voluntary movement, followed soon or late by automatic or unwilld clonic spasms of various parts.

“Group second.—The disease never gets beyond the first stage of incoördination. Just as in some sclerosis of the cord there is no tremor save during volitional acts, so here the irregular motions only occur during willed actions.

“Group third is, I think, the most unusual type, but I see occasional cases every spring. In this there are constant automatic, irregular clonic spasms usually of the hands, but during volitional acts these entirely vanish, and the most complicated acts are well performed and without obvious incoördination. In other cases voluntary motion merely lessens the spasmodic activity, but does not abolish it.”

If this last class or group is to include those cases in which the choreic incoördination is more or less controllable by the will of the patient, we should hardly consider it a rare form. We have seen a number of cases in which complicated voluntary motions were not interfered with to any great extent by the chorea, which was at other times quite marked.

The last chapter is simply a restatement of the author's plan of treatment by rest, and skim-milk, and massage of certain neurasthenic conditions. It appears to us here that some allusion to the recent memoir of Drs. Putnam-Jacobi and White on the combination of the cold pack with the massage in some of these cases might have been appropriate. These authors seem to have demonstrated that there is a decided value to this form of hydrotherapy in the treatment of some of these anæmic and neurasthenic cases.

In conclusion, we will say of the work that it is in very many respects an excellent one, and one that we have found profit in reading. And yet we must still confess a feeling that to have produced it would have been more to the credit of a medical writer with a reputation less exalted than is that of Dr. Mitchell.

Das hirngewicht des menschen. Eine studie von Dr. THEODOR L. W. v. BISCHOFF. Bonn, 1880. (*The brain-weight of man.*)

The material upon which Dr. Bischoff has based this volume is the examination of about 900 bodies, with reference to the brain-weight as influenced by sex, age, weight, and size of body. His actual measurements he tabulates in four different orders in the appendix, and thereby places his material at the command of any one who chooses to utilize it. He criticises justly all his predecessors for having omitted such tabulations, as the reader is thereby confined to the author's personal deductions. Bischoff's measurements were taken with a care commanding full confidence. He claims himself that the greatest objection which can be raised against some of his comparisons, is the fact that the bodies examined were dead from all varieties of disease, altering the bodily weight, though evidently influencing but very little the weight of the brain. Moreover, the occurrence of loss of weight by wasting diseases is about balanced in his large statistics by the gain from dropsy in other instances.

The deductions from these statistics, as well as the results of other authors, are discussed in some 170 pages in a very unassuming way, avoiding any display of ingenious theorizing which

the subject does not warrant. The influence of sex is first considered. A table is given, quoting the average weight calculated by different observers for male and female brains. Wide variations are to be found amongst the authors, which must really be expected, unless very large figures can be commanded. The author has found the male brain to vary from 1,018 to 1,925 grams, and the female from 820 to 1,565. His averages are 1,362 for the male, and 1,219 for the female, showing an average difference of 143 grams. His figures agree best with those of other authors of similar experience, like Rob. Boyd. All these statistics refer to Europeans, mostly of the lower classes, to be found in hospitals. All authors admit the difference between the sexes, usually amounting to about 8 to 9 per cent. This difference shows itself also by the fact that the healthy male brain rarely, if ever, weighs less than 1,000, and may amount to 2,000, while a female brain of 830 is no great rarity, and female brains above 1,600 are not met with. This sexual difference cannot be explained alone by differences in weight and stature, since no other factor possesses so marked an influence as the sex.

The weight of the brain does not appear proportionate at all to the bodily weight, when a few instances only are taken at hazard. It is only when large numbers are considered that the parallelism becomes apparent. By grouping his results in classes, increasing each by 10 kilo. in weight, Bischoff shows that, other influences aside, the heavier the body the heavier also may we expect the brain to be. In the individual instance, however, we cannot predict the brain-weight thereby. His tables show clearly the difference of sex, since in comparing classes of the same weight the male brains have still the advantage.

The relative weight of the brain to that of the body is accordingly a figure within wide limits. As the mean of all observations, Bischoff states it as 1 in about 35. On the whole the proportion increases as the weight diminishes, so that small individuals have a relatively heavier brain.

The influence of the bodily size is, on the whole, parallel to that of the weight. In small series the individual variations may mask this factor completely, but Bischoff's extensive figures show after all that the larger the stature the heavier may we expect the brain, with this provision, that a relatively heavier brain is possessed by smaller individuals. This general statement applies to comparisons amongst various animal species as well.

The relation of age to the brain-weight is illustrated by the

author by very copious statistics, but which do not really teach much. The normal brain, of course, continues to increase in weight until growth is completed, which seems to require about 20 years for the female, but between 20 and 30 years for the male. Amongst a small number of embryos Bischoff found rather wide variations not corresponding alone to the age. The mean brain-weight of 12 new-born boys was 367 grams, and of 12 girls 396. The difference is here reversed; perhaps on account of the small numbers. The relative weight of the brain to the body is about 1 to 8 at birth; which proportion decreases, of course, with the age. The brain loses again in weight about the sixtieth year of age; perhaps earlier in the female.

The influence of race is discussed, but only very few reliable figures can be quoted. The numbers examined by most observers were too small, and the various factors of influence were insufficiently quoted. Anthropologists have often attempted to estimate the brain-weight by gauging the skull-capacity. Bischoff, however, objects to this method. According to his comparative measurements the error may amount to even 15 per cent., or more. The chances for comparative researches on different races are certainly much more favorable in this country, but we can find the name of no American author in the book but that of Morton.

Hereupon follow two interesting chapters on the relative weight of the separate cerebral portions, and the relation of the weight to the extent of convolutions. No distinct formulations can be abstracted from this discussion. In the next place he compares the brain-weight to the intelligence, admitting as the result of rather limited observations that a parallelism does exist, but is often masked by individual variations and the influence of other factors.

The final chapter is devoted to a general summary, with attempts at explanations. It cannot be said, on the whole, that many wholly new statements are to be found in the work. Its main merit is the discussion of mooted questions upon the basis of more positive and larger material than has hitherto been employed. The book, hence, amounts to a complete summary of our present knowledge upon the subject, rendered more positive by the author's personal researches. While speculative theorizing is avoided on the whole, the work is still quite suggestive on many points. The enjoyment of reading it is badly marred by the often cumbersome style of the author.

H. G.

Editorial Department.

THE highly important and intensely practical question as to the relation of insanity to crime, or, to state the matter another way, as to the responsibility of the insane before the law, has been brought to the attention of the people of this country as never before, in consequence of the recent horrible endeavor to assassinate the President of the United States. Opinions without number have been expressed, of course, as to the sanity of the dangerous wretch by whom the attempt was made.

Whether he is sane or insane is a question, however, which can be decided only in full view of all the facts germane to his case, and in a calmer state of feeling than has been known up to this time by any right-minded citizen.

The startling character of the case grows out of its unusual and widespread relations, rather than from its novelty. Such crimes are committed with great frequency, in which persons treading the humbler walks of life are the victims, and in which, in the eye of the law, the same aggravating features are present. Almost daily, in some part of our broad land, the life of some person is unexpectedly endangered or sacrificed at the hands of some ill-balanced or insane individual. In no class of cases is well-tempered justice more likely to be baffled than in dealing with such insane criminals. Society, horror-stricken by such events, cries out, with the instinct of self-preservation, for the speedy and condign punishment of the criminal, and yet the hand of justice is stayed, as it ought to be, by the plea of irresponsibility.

That there are insane criminals there can be no question. That responsibility in the presence of the law is attenuated in various degrees by unsoundness of mind cannot be doubted. That the plea of insanity will be set up whenever possible, is to be expected, for, as a rule, it is in human nature to adopt every possible expedient to avoid the extreme penalties of the law. According to the rule in such cases, it may be confidently expected that the plea of insanity will be made in behalf of the criminal Guiteau. For the credit of human nature, and in view of such facts as have been already made public, we do not see how it can be held that the criminal was sane. We have no reasonable doubt of his unsoundness of mind.

The important question with this class of cases is, what shall be done with them? We have long been convinced as to what the proper course is to adopt in such cases. It is this: Whenever, in the case of murder or any other flagrant crime against society, the plea of insanity is set up and successfully maintained, then the penalty should be the incarceration of the criminal for life in a prison asylum. Under no circumstances should such a person be turned loose into society again after having manifested such dangerous tendencies.

It is our hope that one of the results which may grow out of the event which has so shocked the nation, may be the passage of simple, stringent, well-considered laws providing for the disposal in this way of all dangerous insane criminals. In this way only can society protect itself and justice considerably avoid blind and useless severity. If such a plan were adopted and rigorously carried into effect, the plea of insanity would be made more rarely than at present.

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

THE NERVE CELLS IN THE CEREBRO-SPINAL GANGLIA AND PERIPHERAL CRANIAL GANGLIA have been very exhaustively studied by G. Retzius in a recent article in the *Archiv f. Anatomie* (1880, p. 396). He examined a number of species throughout the entire vertebrate series. While there is nothing startlingly new in his results, the thoroughness of the author renders his descriptions authoritative, and does away with much of the obscurity hitherto prevailing in this subject. He finds that in the spinal ganglia divisions of myelated nerve fibres are a very common occurrence. In batrachia, birds, and mammals the nerve cells of these ganglia present only one process, and this filament, after receiving an investing sheath of myeline and assuming the appearance of an ordinary myelated nerve fibre, joins, probably in all cases, another nerve fibre at a point of constriction forming the T-shaped junction of Ranvier. But this apparent junction is probably really to be considered a division of the myelated cell-process. Whether one of the resulting branches runs peripherally and the other toward the spinal cord, cannot be decided with present means. It can, likewise, not be decided whether all cell-processes undergo this division.

The jugular and cervical ganglia of the vagus, the jugular and petrosal ganglia of the glosso-pharyngeal, the geniculate ganglia of the facial, and the semilunar ganglia of the trigeminus must rank as true cerebro-spinal ganglia as judged by their structure. The ganglion of the auditory nerve can also be included in this category, though presenting some peculiarities. In the cerebro-spinal ganglia even the smallest nerve cells are seen to have processes, which assume the appearance of non-myelated fibres, and

are sometimes found to divide. Whether these processes ultimately obtain a sheath of myeline could not be decided. The occurrence of apolar cells is highly improbable. Of the other cranial ganglia, the otic, sphenopalatine, and submaxillary ganglia must be considered as belonging to the sympathetic system, by reason of their histological structure. As regards the ciliary ganglia the author is not quite decided. His histological researches compel him to regard it as a sympathetic ganglion, while Schwalbe's investigations in comparative anatomy demonstrate it as the true ganglion of the motor oculi.

THE DILATOR NERVES OF THE PUPIL.—M. François-Franck publishes in the laboratory reports of Marey, iv, 1879-79, the following interesting researches, of which we find an abstract in the *Centralblatt f. d. Med. Wiss.*, No. 15, 1881.

The movements of the iris, as well as of all other delicate tissues, are under the influence, at least to some extent, of the blood-vessels, but not entirely so. The dilator nerves of the iris separate themselves from the vaso-motor nerves at two points—one right over the superior cervical ganglion, the other at the level of the ciliary nerves. Franck found that above the superior cervical ganglion two fibres enter the skull through the carotid canal. One of these dilates the pupil, when irritated, without influencing the vessels. On testing the nerves which pass from the ophthalmic (ciliary) ganglion along the optic nerve, two sets of fibres are likewise found, mainly contractors, but also some dilators. It can likewise be shown that irritation of the sympathetic nerve produces dilatation of the pupil much sooner than vascular contraction, and that the former result does not last as long as the latter.

Division of the fifth, fourth, and third dorsal communicating rami (of the sympathetic) causes a slight momentary dilatation of the pupil. The same result is obtained by dividing the first and second dorsal rami, as well as the branches passing from the eighth, seventh, sixth, and fifth cervical roots to the first thoracic ganglion. This ganglion, therefore, receives dilator fibres coming from the cord in an ascending as well as in a descending direction. They ascend thence through the anterior branch of the loop of Vieussens to the inferior cervical ganglion. The upper thoracic ganglion serves as a tonic centre for the dilator nerves of the pupil.

The dilator fibres thence ascend with the cervical sympathetic

through the first cervical ganglion, reaching the iris ultimately by way of the Gasserian ganglion and ophthalmic branch of the trigeminus. Other dilator fibres exist in the fifth nerve even before it reaches its ganglion, but, on cutting these, the reflex dilatation of the pupil is not interfered with as long as the filaments derived from the sympathetic are intact. Section of the ophthalmic ramus (5th nerve) of course contracts the pupil, but irritation of its peripheral end does not dilate, on account of reflex activity of the motor oculi started by the irritation of fibres of recurrent sensibility. Total dilatation of the pupil can be induced by irritating a single one of the ciliary nerves. The effect is *very slow* on having a mild current, but prompt with stronger stimulus.

The contracting fibres exist in the trunk of the third nerve passing through the ciliary ganglion into the ciliary nerves. Section of the latter produces a more decided effect than division of the motor oculi, on account of a tonic action of the ganglion. The entire iris can be affected by irritation of a single ciliary nerve, probably on account of abundant peripheral inosculation. Simultaneous and equal irritation of ciliary nerves and cervical sympathetic produces only dilatation (by interference). But on using feeble currents on the sympathetic nerves and subjecting the motor oculi to strong reflex stimulation by light, the pupil contracts at first, dilating moderately afterward.

THE INFLUENCE OF THE FIRST CERVICAL GANGLION ON THE IRIS has been examined in frogs by J. Tuwim (*Pflüger's Archiv*, vol. 24, p. 115). By cutting the cervical sympathetic on one side, and extirpating the ganglion on the other, he finds on the latter side a narrower pupil. In other words, the presence of the ganglion exerts a tonic influence on the musculature of the iris. In order to avoid errors, the definite observations should be made 24 hours after the operation, to escape the effects of transitory irritation. The statement is one of capital importance, since this would be the first instance of any well-proven action of a sympathetic ganglion. The result can be demonstrated also by the destruction of the cord and brain and of the ganglion of one side, whereupon the corresponding pupil contracts more than the pupil still connected with its ganglion. The ganglion does not receive any pupil-dilating fibres by anastomosis from the hypoglossal, as Budge had asserted. For the mammal the author claims, likewise, a direct influence of the first cervical ganglion on the iris. He

maintains that the degeneration of the divided sympathetic does not occur as long as the ganglion exists. But his article does not furnish adequate proof. He claims, further, a difference in the size of the pupil according to whether the sympathetic nerve is severed alone or the ganglion removed. But his observations are so imperfectly reported as not to inspire confidence, at least for his experiments on mammals.

IRRITABILITY AND CONDUCTIBILITY OF NERVE FIBRES.—

Many attempts have been made to separate these two properties, for instance, by Schiff and by Grünhagen, who both claimed that the irritability of a portion of a nerve could be destroyed, while influences generated higher up could yet pass through this part. Extending an experiment proposed by Grünhagen, J. Szpilinan and Luchsinger have arrived at some interesting results (*Pflüger's Archiv*, vol. 24, p. 347). The experiment consists in exposing a part of the trunk of a frog's nerve to the action of CO_2 in a glass tube, through which the nerve is drawn. The irritability is tested, both at the cut end and at the part exposed to the gas, by electrodes, connected with an induction coil. Grünhagen had claimed that the CO_2 could deprive the nerve of its local irritability, but leave intact the power of conduction. But the authors found different results. In the first place, they were struck with the greater irritability of the nerve at the cut end, which diminished gradually as the nerve is tested nearer to the muscle. They, hence, contend for Pflüger's avalanche theory, but overlook that this result is to be found only in divided nerves. On poisoning a part of the nerve with CO_2 , Grünhagen's result is apparently obtained, but on continuing the experiment the following was noticed: The lower (poisoned) part is not irritable; it merely requires a stronger current. But on allowing the agent to act further, the upper end is now found wholly deprived of irritability, while the lower part is still excitable. In other words, the effect of CO_2 , and still more of ether or any other anæsthetic, or NH_3 applied to one part of the nerve, causes the nerve to lose its excitability from the centre toward the periphery. On removing the poisonous vapor by a current of air, the excitability is recovered in the reverse order. The authors, hence, claim that conductivity depends upon the propagation of the excited state from one molecule to the other.

THE PHYSIOLOGICAL CONNECTION BETWEEN THE GANGLION CERVICALE SUPREMUM AND THE IRIS AND THE ARTERIES OF THE HEAD.—Tuwim, *Pflüger's Archiv*, xxiv, p. 115 (abst. in *Centralbl. f. d. Med. Wissensch.*, No. 16), has found that, in frogs, the contraction of the pupil during the first half hour after section of the sympathetic has not attained its maximum, and that its subsequent increase cannot be due to the removal of the influence of the ganglion supremum by the section, as Liegois and Vulpian have supposed. The dimensions of the pupil are always smaller after than before the operation; but the pupil of the side on which the ganglion supremum remains is always greater than that of the other side on which it has been torn out. This reveals the fact that the ganglion supremum actually exerts a tonic influence on pupil-dilating fibres given out by it, which asserts itself in frogs by increased pupillary dilatation.

Rabbits and cats, in whom the ganglion supremum of one side had been extirpated, showed a greater dilatation of the pupil from atropine on the side operated upon than on the other. If only the sympathetic was divided on the one side before it reached the superior cervical ganglion, together with all the nerve twigs connecting with the latter, the pupil of that side was more contracted than that of the side not operated upon. In a third series of experiments, the pupil of the side on which the ganglion had been extirpated was always wider than that of the side on which it had been separated from its connection with the central nervous system. Hence it appears that there pertains to the ganglion supremum positive influence over the movements of the iris, which is not abolished by the section of all its connections with the central nervous system.

If the ganglion of one side in a frog is extirpated, and on the other side the sympathetic is divided before its entry into the ganglion, an equally marked vascular dilatation is observed on both sides of the tongue. If this operation is performed upon rabbits, the same condition is observable in the vessels of the ears. Hence it follows that the ganglion cervicale supremum has not the least influence on the vessels of the tongue or of the ears.

VASO-MOTORS OF THE LYMPHATICS.—MM. Paul Bert and Laffont have discovered the vaso-motors of the chyloiferous glands. They opened the abdomen of an animal in warm water, while the process of digestion was in full play. The lacteals then

reveal themselves in the form of white cords, and it suffices to simply excite the solar plexus or the great splanchnic nerve, to render visible the nodosities that form along these vessels. These experiments were announced to the Société de Biologie, Apr. 2, and repeated in *Le Progrès Médical*, No. 15.

INFLUENCE OF THE SECTION OF THE TRIGEMINUS UPON THE EYE.—At the session of the Société de Biologie, Apr. 2 (reported in *Le Progrès Médical*), M. Poncet (of Clunÿ) reported the results of the experiments he had made on this subject. After showing the agreement among physiologists at the present time as to the traumatic origin of the consecutive corneal ulcer, he pointed out the rôle that the discoveries of Franck and of Dastre and Morat should play in the pathological physiology of the trigeminus, the former having demonstrated the action of a special filament of the sympathetic, the latter having proved the vaso-dilator action of the sympathetic on the labial mucous membrane. M. Poncet has found with M. Dastre that the vasodilatation by excitation of the sympathetic extends to the veins of the retina.

In the eyes of a rabbit, after section of the trigeminus, performed by M. Laborde himself, and after periods of eight, fifteen, and thirty days, and one year, he observed the following: (1) In the nerves of the cornea, the degeneration of which has been so well described by Ranvier, he found also, after a year, the complete regeneration of the corneal plexus in a mode altogether different from the normal one. In the midst of the inextricable nervous maze, he found nerve sheaths or old tubes that had not been regenerated. (2) The keratitis, which may be accompanied by an exudation into the internal chamber, especially affected the superficial corneal lamina. Neither iritis, nor suppuration of the processes, nor posterior choroiditis, nor disorder of the humors, nor migration of pigment in the retina, nor detachment of that membrane, existed, but in the retina the most internal layers are the seat of an œdema, characterized by the presence, between the optic fibres, of œdematous masses, perhaps due to hypertrophic degeneration of the ganglion cells; finally, by the increased volume of the protoplasm of the internal granulations. The other layers are healthy. These alterations differ essentially from those produced by the optico-ciliary section described by the author in preceding communications.

THE NEURO-PATHOLOGICAL SIGNIFICATION OF THE CONDITION OF THE PUPIL, Raehlmann, *Volkman's Klin. Vorträge*, No. 186, 1880 (abstr. in *St. Petersb. Med. Wochenschr.*).—The condition as to the diameters of the pupil depends upon these factors, the excitation by light, the convergence of the visual axis in accommodation, and the condition as to excitation of the sympathetic. The author, after a brief physiological introduction, considers the movements of the pupil in their relations to neuro-pathological conditions, and lays down the following valuable practical propositions :

I.—Reaction from light.

1. If the illuminated pupil does not react, but the other one not illuminated acts, then the optic nerve of the former is not at fault, but the failure depends rather upon unilateral paralysis of the pupillary branch of the corresponding oculomotorius, or upon some affection of the iris itself.

2. If the pupil reacts in spite of complete blindness, the cause of the phenomenon must be looked for on the other side of the corpora quadrigemina, which, according to Meynert and Druim, are directly connected with the motor oculi nucleus.

II.—Reaction from convergence movements.

3. If both pupils react from convergence of the optic axis, then the pupillary functions of both motor oculi nerves are intact ; the pupils contract ; and it is practically important in this experiment to have the subject try to look at the tip of his own nose.

4. If the two pupils do not react either directly or sympathetically to light, but do react with movements of convergence, and the power of sight is returned to any extent in one or both eyes, there exists a hindrance to conduction in the fibres between the corpora quadrigemina and the motor oculi.

III.—Reaction from innervative conditions of the sympathetic.

After a short but exhaustive statement of the physiological alterations of the iris dependent upon excitations of the sympathetic, the author comes to the conclusion that pupillary dilatation especially depends upon the amount of irritation conveyed to the sympathetic from the cervical cord, through sensory routes and psychic excitations. In a pathological condition it is noticed that :

5. In physically debilitated cases, nervous individuals, and maniacs, an unusually dilated pupil is frequently observed, so constantly, indeed, that contracted pupils are looked upon in these cases as ominous symptoms of coming paralysis. There often occurs in these conditions, as well as in hysterical subjects and epileptics, a rhythmic alteration of the pupil, independent of the illumination or the convergence of the visual axes.

6. Narrow pupils are symptomatic of the disorders attended with diminution of the cortical function, especially in dementia paralytica.

7. Myosis is especially frequent in diseases of the spinal cord and medullo-spinal myosis; in tabes the contracted pupil is often perfectly insensible to light, while still reacting well with convergence movements.

8. Alterations of the pupil depend upon the simultaneous innervation of the sympathetic; an irritation of this latter in its peripheral course or in its cervical ganglia may show itself by pupillary dilatation (hemicrania, lead colic, Basedow's disease, intestinal irritation in children).

9. A dilated pupil is a very characteristic symptom of embarrassed respiration from the effects of carbonic acid on the medulla, as in whooping cough, vomiting attacks, eclamptic and epileptic attacks, labor pains, and phthisis. This symptom is of importance in chloroform narcosis; the utmost contraction showing when the extreme degree of narcosis is attained, that its dilatation from sensory irritation indicates that the patient is coming out from its effects. But if the pupil suddenly dilates while the narcosis persists, threatened asphyxia from carbonic acid poisoning is indicated.

10. The pupils are dilated with cerebral compression, tumors of the brain with choked disk, chronic hydrocephalus, hemorrhages in the cranial cavity, and in simple cerebral congestion.

11. Differences in the normally mobile pupil are signs of irregular innervation of the sympathetic, due to some irritation of the nerve either in its peripheral course or in its connection with the cerebral or spinal centres. A little atropia in the eye will show in any given case whether it is to a paralysis or to an irritation that the dilatation is due; in the first case it will be very slight, in the second very pronounced.

Unilateral mydriasis of a mobile pupil is a very important symptom of threatening brain disease, while the same with immobility (paralysis of the motor oculi) is not of much signifi-

cance. Unilateral dilatation in a normally reacting pupil is always a sign of unilateral irritation of the sympathetic, and is, especially when sometimes one, sometimes the other eye is affected, a very unfavorable one. The dilated pupil from sympathetic irritation reacts poorly to stimuli of light, but contracts with movements of convergence, and is thus distinguished from mydriasis due to oculo-motor paralysis, and, besides, coëxists with absolutely intact accommodation. Pupillary inequalities are very frequently met with in the insane, especially in paralytics and demented cases.

CORTICAL CENTRES OF VISION.—Dr. J. C. Dalton, *N. Y. Med. Record*, March 26th, has repeated Ferrier's experiment of destroying the angular gyrus in monkeys and dogs, and with the same result—blindness of the eye on the side opposite the hemisphere of the brain operated upon. But he found the blindness persistent, instead of temporary, as was the case in Ferrier's monkeys. He deduces the following conclusions :

1. Extirpation of the angular convolution causes loss of visual perception on the opposite side.
 2. This operation is not followed by any disturbance of the intelligence attitude, power of locomotion, or general sensibility.
 3. It does not interfere with the local sensibility of the retina or conjunctiva, the reaction of the pupil to light, nor with the normal consentaneous movements of winking. Its effects, therefore, are confined to the exercise of visual sensibility.
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A NEW CORTICAL CENTRE.—Dr. Græme M. Hammond, in a paper read at the New York Neurological Society, *N. Y. Med. Record*, March 19th, has studied the location of the giant cells of Betz, in the brain of the cat. He finds that they are not localized, as Betz had stated, but were less numerous near the sulcus cruciatus than posteriorly to it, and he has even found them not far from the base of the brain. The largest group of these cells he found in a locality not determinately fixed by physiologists as a motor centre,—in the first primary arched gyrus, between the Sylvian and anterior Sylvian fissures. It is nearer to a locality which Ferrier designated as a centre, excitation of which caused partial divergence of the lips, than to any other discovered motor centre, but it does not correspond exactly to that. The cells here are more ovoid or circular than the pyramidal ones of Betz and Mierzejewski, and even longer than the latter.

Dr. Hammond concludes his paper as follows : " Taking the deductions which have been based upon the existence of these cells, on their merits, we find that those who have relied on this demonstration for the support of the theory of motor centres are reduced to a number of predicaments. 1. That the largest giant cells have been found in the brain of carnivora, where no motor centre has been clearly demonstrated, and near which only small muscles are supposed to receive their cortical innervation. 2. That if, after all, this is a motor centre, the method of localized electrization was incompetent to detect it. I have limited myself, this evening, to this fact. I need not say that the giant cell was known to Meynert, although its locality was not accurately described by him. He claimed that the larger gyri of the frontal lobe contained the largest cells. On the other hand, cells as large as the giant cells can be seen through the entire occipital lobe, according to this observer, in the two white strata, and were described by him by the name of 'solitary cells.' I trust, at no distant date, to review the entire question of the distribution of large cortical cells, with measurements, and to submit them to the Society.

" For the present, I think the existence of the large cortical cell-group which I have described, shows conclusively, that before the existence of large cells can be considered a demonstration of the correctness of functional localization, a more extended study must be made."

ANATOMICAL NOMENCLATURE OF THE BRAIN.—Dr. Burt G. Wilder (*Science*, March 19 and 26) proposes a new nomenclature of the brain, which he supports by rather satisfactory arguments. Inasmuch as cerebral anatomy is, in a measure, in an unsettled condition, and in all its details is yet unfamiliar to the great majority of physicians and students, the proposed system may not be objected to, though novel in its appearance.

It will be seen that it does not extend to the external convolutions and fissures of the brain, and no purely histological features are included. Some parts of the cerebellum and medulla are also omitted, but without these about 150 distinct names are given, most of them referring to more or less distinct parts, but a few indicating general regions distinguishable by color or elevation.

" Most of the names," he says, " are those in common use, with the omission of superfluous elements like *corpus*, and the genitives of the names of more comprehensive parts. Most of the appar-

ently new names will be found to be old acquaintances under such thin disguises as *translation*, *transposition*, *abridgment*, and the substitution of prefixes for qualifying words. In a few cases the old names are wholly discarded for briefer new ones. Most of the new names, however, refer to parts apparently unobserved hitherto (*e. g.*, *crista*, *corina*, *delta*) or to parts which—although probably observed—seem not to have been regarded as needing a special designation (*e. g.*, *aula*, *quadrans*, *corpus præpontile*)."

Dr. Wilder asks for the fullest and freest criticism, both as to the general idea of his proposition and the special terms proposed.

The following is the nomenclature he proposes :

ALBICANS (corpus).—*abn.*—*C. candicans*, *c. mammilare*, etc. Unable to ascertain which of its many titles has priority, I select that which indicates its most obvious feature on the fresh brain.

AMYGDALA (cerebelli).—*ag. cbl.*

ARACHNOIDEA (membrana).—*Ach.*—The arachnoid layer.

ARBOR VITÆ (cerebelli).—*Arb.*

AREA CRURALIS.—*Ar. cr.*—The general region of the base of the brain between the pons and the chiasma. The middle region, or region of the isthmus.

AREA ELLIPTICA.—*Ar. el.*—An area, in the cat, just laterad of the ventripyramis. Perhaps it represents the "inferior olive."

AREA INTERCRURALIS.—*Ar. icr.*—The interpeduncular space. The mesal part of the *Area cruralis*.

AREA POSTPONTILIS.—*Ar. ppn.*—The ventral aspect of the metencephalon (medulla). The caudal one of the three general regions into which the base of the brain may be conveniently divided for description. It is more extensive, relatively, in the cat than in man.

It will be noted that the adjective *pontilis* follows the analogy of *gentilis* rather than *montanus* or *fontinalis*. The form *pontal*, however, has been used by Owen. (A. III.)

AREA PRÆCHIASMATICA.—*Ar. prch.*—The cephalic one of the three areas of the base of the brain. The space cephalad of the chiasma.

AULA.—*a.*—The cephalic portion of the third ventricle; the prethalamic part of the "third ventricle," between the "two portæ, or *foramina Monroi*;" 'aula,' Wilder, 3 and 5." "The here common ventricular cavity," in *Menobranchus*, Spitzka, 6, 31. This represents the cavity of the "unpaired hemisphere vesicle," formed by a protrusion from, or constriction of, the "anterior primary encephalic vesicle;" the aula is relatively larger in some of the lower vertebrates.

AULIPLXUS.—*apx.*—The plexus of the *aula*. The free border of the fold of *pia*, known as the *velum*, forms a vascular plexus in the *aula*, in each *porta*, and in the *medicornu* of the *procalia*. In place of compound terms, like *plexus aula*, I suggest that single terms be formed, *auliplexus*, *portiplexus*, and *proplexus*. For the plexuses of the *dicelia* and *metacelia*—the "third" and "fourth ventricles"—we may use *diplexus* and *metaplexus*.

BASICOMMISSURA.—*bcs.*—"The basilar commissure of the thalami," Spitzka, 2, 14. The ventral continuity of the two thalami.

BIVENTER (cerebelli).—*bv.*—The biventral lobe of the cerebellum.

BULBUS OLFACTORIUS.—*B. ol.*—The olfactory bulb. The more or less expanded cephalic part of each lateral half of the rhinencephalon, consisting of the *pes* and *pero*. Often called *olfactory lobe*.

CALAMUS (scriptorius).—*clm.*

CALCAR (avis).—*clc.*—*Hypocampa* or *hippocampus minor*.

CALLOSUM (corpus).—*cl.*—*Commissura cerebri maxima, trabs medullaris*, etc.

CANALIS CENTRALIS (myelonis).—*Cn. ce.*—The central canal of the spinal cord.

CARINA (fornicis).—*ca.*—The mesal ridge of the caudo-ventral surface of the *fornix*, dorso-caudad of the *crista*. I am not sure of its existence in man.

CAUDA STRIATI.—*cd. s.*—"Surcingle," Dalton (1, 13); the slender continuation of the *striatum* caudo-ventrad. If a new name is required for this longer "tail," which was described by Cuvier (B. 111, 51) as forming, with the *striatum* proper, a "horse-shoe," Prof. Dalton's "surcingle" may be technically rendered "cingulum." I have not yet looked for the *cauda* in the cat.

CEREBELLUM.—*cbl.*—Several of the external features of the *cerebellum* are omitted from this paper.

CEREBRUM.—*cb.*—The *prosencephalon*, less the *striata*. The *hemisphæræ*.

CHIASMA (opticum, or nervorum opticatorum).—*ch.*—The optic chiasma or commissure.

CIMBIA.—*cmb.*—"Tractus transversus pedunculi," Gudden, as quoted by Meynert (A. 737). A slender white band across the ventral surface of the *crus cerebri*. It is a distinct ridge in the cat. The word is used in architecture to denote a *band* or *fillet* about a pillar, and is here proposed as a fitting substitute for Gudden's descriptive name.

CINEREA (substantia).—*c.*—The gray matter of the nervous organs.

CLAUSTRUM.—*cls.*—The "*claustrum*" (Burdach), "*nucleus tæniæformis*" (Arnold), as stated by Quain, A. II, 564.

CÆLIA.—*C.*—A ventricle of the *encephalon*. For a brief statement of the reasons for substituting this for the word *ventriculus*, see elsewhere in this article.

COLUMNA FORNICIS.—*Co. f.*—The anterior pillar of the fornix, assuming that there is one upon each side. It would be convenient to have a single short name.

COMMISSURA FORNICIS.—*Cs. f.*—In the cat, a distinct band across the caudal aspect of the *fornix* just ventrad of the *crista*, and apparently uniting the two columnæ more closely.

COMMISSURA HABENARUM.—*Cs. h.*—A white band connecting the caudal ends of the habenæ, and forming the dorsal border of the *Fm. conarii*.

CONARIUM.—*cn.*—The *glandula pinealis*. *Epiphysis cerebri*. *Penis cerebri*.

CORONA RADIATA.—*Cn. r.*—*C. radians*.

CORPUS PRÆPONTILE.—*Cp. prp.*—A slight white longitudinal ridge of the *postperforatus*, near the meson. It is distinct in the cat. When more fully known, perhaps a better name may be found.

CORTEX (cerebri, or cerebelli).—*ctx.*—The ectal layer of gray and white substance at the surface of the cerebrum and cerebellum.

CRENA (calami).—*crn.*—The caudal end or notch of the metacoelis.

CRISTA (fornicis).—*crs.*—A small but, in the cat, very distinct ovoid mesal elevation of the caudal surface of the *fornix*, ventrad of the *carina*, and dorsad of the *commissura fornicis*, and the *recessus aulæ*. It is also present in the human brain. Wilder, 7.

CRUS CEREBRI.—*Cr. cb.*—Pedunculus cerebri.

CRUS OLFACTORIUM.—*Cr. ol.*—The isthmus by which the *bulbus olf.* is connected with the *prosen*.

CRUSTA (cruris cerebri).—*cst.*

DECUSSATIO PINIFORMIS.—*dc. pnf.*—"Piniform decussation," Spitzka,

DECUSSATIO VENTRIPYRAMIDUM.—*dc. vpy.*—"The "decussation of the anterior pyramids."

DELTA (fornicis).—*d.*—A subtriangular area of the ventro-caudal surface of the fornix of the cat. The lateral angles are the *portæ*, and the apex points dorso-caudad. It is bounded by the lines of reflection of the *endyma*, and represents the entocoelian surface of the *fornix*. Wilder, 5. It probably exists in man.

DENTATUM (corpus cerebelli).—*dnt.*

DICÆLIA.—*dc.*—The "third ventricle," or "*ventriculus tertius*," less the *aula*. The interthalamic space, reduced in mammals by the *medicommisura*.

DIENCEPHALON.—*den.*—The *thalamencephalon*, *deutencephalon*, *inter-brain*, enclosing the *dicælia*. Whether it should include also the *aula* and its walls is to be determined by reference to the condition of the parts in some of the lower vertebrates.

DIPLEXUS.—*dpl.*—The plexus of the "third ventricle."

DISTELA.—*dtl.*—The *tela vasculosa* forming the membranous roof of the *dicælia* or "third ventricle."

DORSIPYRAMIS.—*dpy.*—The *posterior pyramid* of the *metencephalon*.

ENCEPHALON.—*en.*—The brain, including the *medulla* or *metencephalon*.

ENDYMA.—*end.*—*Ependyma*. Lining membrane of the ventricles.

EPENCEPHALON.—*epen.*—The hind-brain, or *cerebellum* with the *pons* and its peduncles, and the corresponding part of the *medulla*. It is difficult, perhaps impossible, to define exactly the limits of the *epen*, and the *metencephalon*, and of their respective cavities.

EPICÆLIA.—*epc.*—The division of the ventricular cavity corresponding with the cerebellum. Perfectly distinct in the cat, and even in man, but relatively more extensive in many of the lower vertebrates.

FASCIOLA.—*fscl.*—May not this single word take the place of *fasciola cinerea* and *fascia dentata*? The parts are continuous, and the latter is not *dentate* in the cat.

FILUM TERMINALE (myelonis).—*fl. t.*

FIMBRIA.—*fmb.*—*Corpus fimbriatum*. *Tania hippocampi*. "*Fimbria*," Meyn., A. 667.

FLOCCULUS.—*flc.*—*Lobulus pneumogastricus*. The flocks. This seems to be a different part from the *lobulus appendicularis* of the carnivora, with which it has been sometimes confounded.

FORAMEN CÆCUM.—*Fm. c.*—"Fossa cæca," Spitzka, 3, 6. *Foramen cæcum*

is used by Duglison and Vicq D'Azyr (A. pl. xviii, "48"), and should be retained, notwithstanding the somewhat unusual application of the word *foramen*.

FORAMEN INFUNDIBULI.—*Fm. inf.*—The orifice in the *tuber cinereum* left after the removal of the *hypophysis* and *infundibulum*.

FORAMEN MAGENDIE.—*Fm. mg.*—The communication of the *metacælia* with the "subarachnoid space." Not having satisfied myself as to the nature of this communication, I prefer to quote from Quain, A. ii, 513.

FORNIX.—*f.*—*Camara. Testudo cerebri*, etc.

GENU.—*g.*—*Genu callosi*.

HABENA.—*h.*—*Habenula. Pedunculis pinealis*. There seems to be no need of using the longer word. According to my observations, the *habenæ* have a distinct morphical significance as nearly corresponding with the lines along which the *endyma* is reflected toward the opposite side; 5 and 7.

HYPOCAMPUS.—*hym.*—*Hypocampus major*. The reasons for preferring the form employed by Vicq D'Azyr are presented elsewhere in this article.

HYPOPHYSIS.—*hy.*—Pituitary body.

INFUNDIBULUM.—*inf.*—*Infundibulum cerebri*, etc.

INSULA.—*ins.*—Island of Reil. *Lobus centralis. Insula cerebri. Gyri operiti*.

INTEROPTICUS (*lobus*).—*iop.*—The interoptic lobe, Spitzka, 4, 98; 5. In some reptiles.

ITER.—*i.*—*Iter a tertio ad ventriculum quartum. Aquæductus Sylvii*. A convenient name for the contracted mesocoelia of man and most mammals.

LEMNISCUS INFERIOR.—*lmn. i.*—Spitzka, 4, 95, and 100.

LEMNISCUS SUPERIOR.—*lmn. s.*—I have not been able to identify these parts in the cat.

LIGULA.—*lg.*—"Ponticulus." Ligula, Quain, A. 11, 506.

LIMES ALBA.—*lm. a.*—*Limes alba radialis lateralis rhinencephali*. The white stripe of the lateral root of the rhinencephalon. Perfectly distinct in the fresh brain of the cat.

LIMES CINEREA.—*lm. c.*—The gray stripe of the radix lateralis.

LIQUOR VENTRICULI.—*lq. vn.*—This term is used by Mihalk, A. 163. Is a better one to be found?

LOBULUS APPENDICULARIS (*cerebelli*).—*Ll. ap.* The appendicular lobule of the *cerebellum* of many carnivora, and perhaps other mammals. It seems to have been confounded in some cases with the human *flocculus*, but more probably represents the lateral lobes of the *cerebellum*. Its relations should be studied in a series of related forms. See my paper, II, 217.

LOBULUS OLFACTORIUS.—*Ll. ol.*—The olfactory lobe of the hemisphere. A part of the hemisphere said to be in more direct connection with the rhinencephalon.

LOBUS OLFACTORIUS.—*L. ol.*—A general name for either half of the rhinencephalon, including the crus and the bulbus.

LOCUS NIGER.—*lc. n.*—The *locus niger* of the *crus cerebri*, between the *tegmentum* and the *crusta*.

MEDICOMMISSURA.—*mcs.*—*Commissura mollis*. Middle commissure. "Thalamic fusion," Spitzka.

MEDICORNU (*procœliæ*).—*mcu.*—*Cornu temporale*. The middle or descending horn of the "lateral ventricle."

MEDIPEDUNCULUS (cerebelli).—*mpd.*—*Crus ad pontem.* Middle peduncle of the cerebellum.

MESENCEPHALON.—*men.*—The mid-brain. The *lobi optici, postoptici, and interoptici*, with the corresponding *crura cerebri*.

MESOCELIA.—*msc.* The ventricular division corresponding with the *mesencephalon*. In man and most mammals it is usually reduced and known as *iter*, or *aquæductus Sylvii*.

METACELIA.—*mtc.*—The "fourth ventricle," *ventriculus quartus*. Ventricle of the metencephalon.

METAPLEXUS.—*mtpl.*—The *plexus choroideus* of the *metacælia*.

METATELA.—*mtl.*—The membranous roof of the *metacælia*, or "fourth ventricle."

MONTICULUS (cerebri).—*mnt.*—The ventral prominence of the *lobus temporalis*. Natiiform protuberance. *Alveus. Subiculum.*

MYELENCEPHALON.—*myen.*—The cerebro-spinal axis. The term was proposed by Owen.

MYELON.—*my.*—The spinal cord. Owen. Huxley.

NERVUS OLFACTORIUS.—*N. ol.*—Olfactory nerve.

NUCLEUS LENTICULARIS.—*nc. ln.*—*Nucleus lentiformis.* Meynert.

OBEX.—I have not identified this part.

OLIVA.—*o.*—*Corpus olivarium.* Olivary body. Olive. The "inferior olive." Spitzka.

OPTICUS (lobus). *Natis cerebri.* An optic lobe, excluding the *postopticus* and *interopticus*.

PERO (olfactorius).—*po.*—The softer cap, or shoe-like covering of the rhinencephalic lobe, from which the *nervi olfactorii* directly spring. In the cat this may be accurately removed from the *pes ol.* The Latin *pero* denoted a sort of boot made of raw hide.

PES OLFACTORIUS.—*ps. ol.*—The firmer ental portion of each rhinencephalic lobe. As it is the termination of the crus, and has, in the cat, a somewhat foot-like shape, I suggest the above name for it.

PIA (mater).—*pi.*—In the cat's brain there are indications of at least two layers of the *pia*.

PONS (Varolii).—*pn.*—*Tuber annulare*, etc. There seems to be no need of the qualifying genitive.

PONTIBRACHIUM.—*pnbr.*—" *Brachium pontis*," Spitzka, 4, 100.

PORTIO DEPRESSA (præperforati).—*Pt. d.*—In the cat the (*locus*) *præperforatus* is distinctly divided into two portions, the caudal of which is depressed, while the cephalic is elevated, and sometimes furrowed. Briefer names are desirable.

PORTIO PROMINENS (præperforati).—*Pt. p.*

PORTIPLEXUS.—*ppl.*—The small portion of the free border of the *velum* which hangs in the *porta*.

POSTBRACHIUM (mesen.).—*pbr.*—*Brachium posterius.*

POSTCOMMISSURA.—*pcs.*—*Commissura posterior cerebri.* The posterior commissure.

POSTGENICULATUM (corpus).—*pgn.*—*Corpus geniculatum internum.*

POSTOPTICUS (lobus).—*pop.*—*Testis cerebri.* The caudal eminence of the "*corpus quadrigeminum*." "Postoptic lobe," Spitzka, 4, 100, and 103.

POSTPEDUNCULUS (cerebelli).—*ppd.*—*Crus cerebelli ad medullam.* Inferior peduncle.

POSTPERFORATUS (locus).—*ppf.*—*Locus perforatus posticus.* Posterior perforated space. *Pons Tarini.*

PRÆBRACHIUM (mesen.).—*prbr.*—*Brachium anterius.* I have not identified these parts.

PRÆCOMMISSURA.—*prcs.*—*Commissura anterior.*

PRÆGENICULATUM (corpus).—*prgn.*—*Corpus geniculatum externum.*

PRÆPEDUNCULUS.—*prpd.*—*Crus seu processus ad corpus quadrigeminum.* Superior peduncle of cerebellum.

PRÆPERFORATUS.—*prpf.*—*Locus perf. anticus.*

PROCÆLIA.—*prc.*—Ventricle of the prosencephalon, "Lateral ventricle."

PROPLEXUS.—*prp.*—The plexus of the *medicornu* of the *procalia*. It is the long free border of the *velum*, and, still covered by the *endyma*, enters by the rima. It is continuous with the *portiplexus*, and extends to near the tip of the *medicornu*.

PROSENCEPHALON.—*pren.*—The cerebral hemispheres; *cerebrum* less the *striatum*; the fore-brain.

PROTERMA.—*prtr.*—The primitive *lamina terminalis* or *l. cinerea*. *Terma embryonis*. My reason for suggesting different terms for the adult and embryonic terminal plate, is that, as now understood, the latter includes not only the *lamina cinerea* of anthropotomy, but also the parts afterward differentiated to form the *columnæ fornicis*, and the *præcommissura*, with perhaps some other parts of the *fornix*.

PSEUDOCÆLIA.—*psc.*—*Ventriculus septi pellucidi*. "Duncan's höhle," Læwe, A. 13. Fifth ventricle. This is not a true member of the cœlian series. If it ever presented an opening into the *aula*, it is because of some injury which has torn the brain. This point was urged by be in the unpublished paper No. 4.

PULVINAR.—*plv.*—*Pulvinar thalami*. The posterior tubercle of the human *thalamus*.

QUADRANS (cruris cerebri).—*q.*—In the cat, a depressed area approximately equal to the fourth of a circle, upon the ventral surface of the *crus*, in its mesocephalic angle.

RADIX INTERMEDIA (rhinencephali).—*Rx. i.*—The middle root of the *rhinencephalon*. In anthropotomy, the middle root of the olfactory nerve. In the cat it is little more than a sub-triangular interval between the RR. *lateralis* and *mesalis*.

RADIX LATERALIS.—*Rx. l.*—The lateral root of the *rhinen*. The "external root of the olf. nerve." In the cat it presents a gray and white stripe—*limes cinerea* and *l. alba*.

RADIX MESALIS.—*Rx. m.*—The mesal root of the *rhinencephalon*. The "internal root of the olf. nerve." In the cat it turns pretty sharply from the ventral to the mesal aspect of the brain.

RECESSUS AULÆ.—*R. a.*—A small depression between the two *columnæ fornicis*, and ventrad of the *crista*. The aulic recess.

RECESSUS CONARII.—*R. cn.*—"Recessus pinealis," Reich., A. Taf. ix, *rp.*

RECESSUS OPTICUS.—*R. op.*—This is a pyramidal recess, just dorsad of the *chiasma*, the apex pointing laterad. The term is used by Mihalkovics, A. 79.

RECESSUS PRÆPONTILIS.—*R. prpn.*—The mesal depression which is overhung by the cephalic border of the *pons*. Its floor is formed by the caudal part of the *postperforatus*.

REGIO AULICA.—*Rg. a.*—It may be convenient sometimes to employ this term as a designation for the general region, of which the *aula* is the centre. Within a short distance of the *aula* are many parts of great morphical importance; the whole brain seems to converge thereto. Whoever understands the aulic region will find no serious difficulty with the gross anatomy of other parts.

RESTIFORME (corpus).—*Rf.*—The restiform body of the *metencephalon*.

RHINENCEPHALON.—*rhen.*—The division of the brain, which is united with the cephalic end of the base of the *prosencephalon*, and connected by the *nervi olfactorii* with the *nares*. Each lateral *lobus* includes a *crus* with its *radices*, and the *bulbus olfactorius*, consisting of the *pes* and *pero*,

RHINOCÆLIA.—*rhc.*—The cavity or ventricle of each lateral part of the *rhinencephalon*, and connected with the *procœlia*.

RIMA (cerebri).—*r.*—The interruption of nervous tissue between the *fimbria* and the *tania*, by which the fold of *pia*—still covered by the *endyma*—enters the *procalia* to form the *proplexus*. It extends from the dorsal border of the corresponding *porta* to near the tip of the *medicornu*. In a general way it coincides with a lateral half of the “fissure of Bichat,” or “great transverse fissure.” That, in the cat, the borders of this *rima* are closely united by the intruded *pia*, and that the *thalamus* is *wholly excluded from the procalia*, was demonstrated by me on the 25th of November, 187-, in the presence of my assistant, Prof. S. H. Gage, who recorded it at the time. It was affirmed in my lectures on physiology at the Medical School of Maine in the spring of 1877, and in subsequent courses there and at Cornell University; and was one of the points made in a paper (4) read at the meeting of the Am. Assoc. Adv. of Sci. in 1879. While affirming this of the cat, I stated that the material at my disposal had not enabled me to demonstrate it upon the human brain, but there was no doubt that the same condition would be ascertained when a human brain could be prepared and examined with sufficient care with reference to that feature. In the spring of 1880, Dr. Spitzka informed me that Hadlich had denied lately the appearance of the *thalamus* in the lateral ventricle, presumably of man. The fact is, whoever begins his studies of encephalic anatomy with the brains of the lower vertebrates will soon perceive that—excepting for some rupture of the parts—the *thalamus* can no more form a part of the floor of the “lateral ventricle” than can the *cerebellum* or any other part of the brain.

RIPA (delta).—*rp.*—The border of the *delta* formed by the reflection of the *endyma* upon the intruded *auliplexus*. Probably also in man.

ROSTRUM (callosi).—*rm.*—The rostrum of the *callosum*; much shorter in the cat than in man.

SEPTUM LUCIDUM.—*spt. l.*—This term is not only compound, but based upon two misconceptions: that it is always or even usually *translucent* in mammals, and that it forms a partition between the two *procaliæ* in the ordinary sense. A new term is desirable, which may refer to either of the two lateral halves of the septum, in connection with the *procalia*, or the rest of the wall of the hemisphere.

SPLENIUM (callosi).—*sp.*—The splenium.

STRIATUM (corpus).—*s.*—The intraventricular, or entocœlian portion of what is sometimes called the *corpus striatum*. The *nucleus caudatus*. The caudate lobe.

SULCUS HABENÆ.—*Sl. h.*—The slight furrow along the dorsal border of the *habena*.

SULCUS INTERCRURALIS LATERALIS.—*Sl. ic. l.*—In the cat, a distinct lateral furrow in the *area intercruralis*.

SULCUS INTERCRURALIS MESALIS.—*Sl. ic. m.*—A mesal furrow in the *area intercruralis* of the cat.

SULCUS LIMITANS.—*Sl. li.*—The furrow between the *thalamus* and *striatum*, in which lies the free border of the *fimbria* in contact with the *tænia*. The qualifying word is given in reference to the fact that this furrow is the line of separation between the entocœlian surface of the *striatum* and the ectocœlian surface of the *thalamus*. A shorter and more significant term is desirable.

SULCUS MONROI.—*Sl. Mn.*—The term is employed by Reichert (A. 65, Taf. 11), to designate a part of the *dicælia* of man ventrad of the *medicommisura*.

TÆNIA (semicircularis).—*tn.*—There seems to be no reason why this single word may not replace the numerous compounds by which the part is known.

TEGMENTUM.—*tg.*—The more dorsal layer of fibres of the *crus cerebri*, separated from the *crusta* by the *locus niger*.

TELA.—*tl.*—A general name for the membranous roofs of the *dicælia* and *metacælia*. "*Tela vasculosa*" is employed by Huxley, *I*.

TERMA.—*tr.*—*Lamina cinerea*. The adult *lamina terminalis*.

THALAMUS.—*th.*—*Thalamus opticus* seu *nervorum opticorum*. As has been well remarked by Spitzka (2), this single word is to be preferred upon all grounds to the compounds which have been applied to this part.

TRACTUS OPTICUS.—*tr. op.*—The optic tract.

TRAPEZIUM.—*tz.*—The *trapezium* of the *metencephalon*. Exposed in the carnivora, but in man concealed by the caudal margin of the *pons*.

TUBER CINEREUM.—*T. cn.*—The elevation just caudad of the *chiasma*, to which is attached the *hypophysis* by the *infundibulum*.

TUBERCULUM ROLANDO.—*tbl. R.*—The tubercle or tuber of Rolando, Huguenin, A. 83.

VALVULA (cerebelli).—*vv.*—The valve of Vieussens.

VELUM (interpositum).—*vl.*—The ectocœlian portion of the fold of *pia*, the entocœlian free border of which forms the plexuses of the *aula*, *portæ*, and *procœliæ*.

VENA CHOROIDEA.—*v. ch.*—*Vena Galeni*.

VENTRIPYRAMIS.—*vpy.*—The anterior pyramid. The "prepyramid," Owen, A.

VERMIS (cerebelli).—*vm.*—The median lobe of the cerebellum. This and the other external features of the cerebellum are not here presented with any fulness.

If I venture to hope that a few of the changes proposed in this paper may escape disapprobation, and that all my readers may

not be hostile critics, it is because the times have changed, and such an undertaking is now more likely to be viewed in its true light. I have endeavored simply to define more clearly the necessity for terminological improvement which has been admitted, in some cases unconsciously perhaps, by all who have, for example, substituted *ventral* for *anterior*, *ectogluteus* for *gluteus maximus*, *hypophysis* for *pituitary gland*, *corpus callosum* for *commissura cerebri maxima*, *adrenals* for *suprarenal capsules*, and *basioccipital* for *basilar portion of the occipital bone*.

Dr. E. C. Spitzka, *Science*, April 9th, after commenting on some of Prof. Wilder's terms, suggests the following additions :

CAPPA (*cinerea*?)—The gray cap covering the *Optici*; well developed in most mammalia, rudimentary in man.

ECTOTHALAMUS*.—The outer gray thalamic zone.

ENTOTHALAMUS*.—The inner gray thalamic zone.

INTERCRURALE* (*Ganglion*).—*Ganglion Interpedunculare*^{3, 4}.

SIGMA*.—The S-shaped involution of the nerve-cell layer of the cortex which constitutes the basis of the *Hypocampa*.

NUCLEUS TRAPEZII*.—The superior olive. The development of this body seems to bear an inverse relation to that of the true olive. In man the olive proper is highly developed, in the cat poorly—in the latter the nucleus of the trapezium is well marked and folded; in man it is ill-marked.

OBLONGATA*.—The post-pontal area of man; the *medulla oblongata*.

STRIÆ*.—The *striæ medullares albæ* of the fourth ventricle.

VELUM CEREBELLI*.—The valve of Vieussens; this is the true embryonic starting-point of the cerebellum. The *velum medullare anterius*.

VELUM OBLONGATÆ*.—The *velum medullare posterius*. It arises from the internal division of the *postpedunculus* in its oblongata portion, and covers the posterior part of the fourth ventricle.

VELUM FLOCCULI*.—The *velum medullare inferius*.

GRACILIS* (*Funiculus*).—*Funiculus gracilis*, continuation of corresponding column in cord; part of the posterior pyramids.

CUNEATUS* (*Funiculus*).

TUBERIS* (*Funiculus*).—*Funiculus* of Rolando; the columnar field containing the tuberculum of Rolando. There is a *lobulus tuberis*, which is otherwise provided for.

NODI*.—Two symmetrical eminences, situated each in the shallow depression bounded by the *opticus thalamus* and *habena*, probably corresponding to the *ganglion habenæ* (*Gangl. habenulæ*⁵). There is a notable large opening cephalad of these eminences, which resembles the opening under the *tænia* containing the vein which gives the latter its bluish color. I can find no notice of this opening anywhere. The eminences are represented obscurely in fig. 70 of Henle².

DECUSSATIO FONTINALIS**.—Fontanen artige Haubenkrenzung⁵.

* Terms proposed by myself, not to be found in previous publications.

** A single affix or prefix might be devised in place of *decussatio*, or *fontidecussatio*, *pinidecussatio*, *pyridecussatio*.

In conclusion, I would urge the adoption of some brief arbitrary affix or prefix in place of the words commissure and ganglion. He who limits himself to a study of surface contours will not appreciate the absence of such abbreviations as much as he who is compelled to wade through the labyrinth of the internal cerebral structure.

Gris for *Ganglion* would perhaps do; thus *Grishabena*, *Gristegmentum*, *Grisfastigium* for *Ganglion habenæ*, *Ganglion* and *Nucleus tegmenti*, *Nucleus fastigii*. The term *nucleus* is a very unfortunate one, as it has another and very different meaning which, in my experience as a teacher of cerebral anatomy, has led to confusion in the mind of every beginner. Professor Wilder, who appears to be as much at home in etymology as in cerebral anatomy, will solve these problems no doubt better than I could pretend to.

Among others, the following articles have been recently published on the anatomy and physiology of the nervous system:

LEWIS: Methods of preparing, demonstrating, and examining cerebral structure in health and disease, *Brain*, vol. 4, No. 1, April, 1881. MICKLE: Cerebral localization, *Fourn. Mental Science*, April, 1881. POOLEY, T. W.: Some fallacies of physiological experimentation regarding nerves and muscles, *N. Y. Med. Record*, March 26th. PREYER, W.: Theory of color-blindness, *Centralbl. f. d. Med. Wissench.*, Jan. 1. MANN: A contribution to the study of nervous diseases—somnambulism, catalepsy, *Med. & Surg. Rep.*, June 18, 1881. ENGEL: Descending sclerosis of the tract for tactile sensations and coördination; locomotor ataxia, its anatomy, physiology, pathology, diagnosis, and treatment, *Am. Specialist*, June and July, 1881. SIEFFERT: Spinal meningitis, *Indiana Med. Rep.*, May, 1881. SANDERS: A study of primary, immediate, or direct hemorrhage into the ventricles of the brain, *Am. Journ. Med. Sci.*, July, 1881. HUTCHINSON: Case of spinal inflammation due to traumatism, *Mich. Med. News*, May 25, 1881. FERGUSON: Peripheral paraplegia, *Can. Fourn. Med. Sci.*, June, 1881. DICKINSON: Two cases of cerebral embolism, *Brit. Med. Fourn.*, May 21, 1881. ALTHAUS: Lecture on the physiology and pathology of the olfactory nerve, *The Lancet*, May 21, 1881. CROTHERS: Clinical studies of inebriety, *Med. & Surg. Rep.*, May 7, 1881. BEARD: Terminology of trance, *N. Y. Med. Rec.*, May 21, 1881. BIXBY: Case of hysteroneurosis, *Boston Med. & Surg. Fourn.*, June 30, 1881. MILLS, C. K.: Four cases of tubercular meningitis, *Med. & Surg. Reporter*, July 2, 1881.

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND,
AND PATHOLOGICAL ANATOMY.

DIAGNOSIS OF HYDROPHOBIA.—Three interesting cases have been recently reported, which throw much light on the origin of the many cures of hydrophobia which from time to time appear in the medical journals. Dr. Jas. G. Kiernan, in the *Chicago Medical Review*, March 20, 1881, describes a case in which the post-epileptic condition of a patient suffering from a congenital form of that disease presented all the usually given symptoms of hydrophobia, even to the laryngeal spasm on attempting to drink. In same communication, Dr. Kiernan alludes to a case of acute mania, which at one time came under his observation, and presented marked hydrophobic symptoms. These symptoms disappeared in both cases under the use of conium. Dr. Wm. B. Hazard, in the *St. Louis Clinical Record*, April, 1881, reports a case of acute alcoholism, in which he, being at the time a recent interne of a hospital, made the diagnosis of hydrophobia from the symptoms. The three cases, which are well reported, indicate that there are many neurotic conditions which closely simulate hydrophobia, and that it is extremely probable that the great majority of the contradictions in the history of this disease result from errors in diagnosis.

THE SEMEIOLOGICAL VALUE OF THE PERMANENT RETARDATION OF THE PULSE.—We copy the following from the editorial review of clinical facts of importance of the *Gaz. des Hôpitaux*, No. 36, March 26th.

M. Charcot, in his lectures at the Salpêtrière on diseases of the nervous system, notices, as one of the most interesting facts, but also one of the least remarked ones, of the symptomatology of cervical spinal lesions, the permanent slowing of the pulse. Recognizing thoroughly that the phenomenon of retarded pulse may have as its cause an organic affection of the heart, as many authors have demonstrated, M. Charcot, having observed this phenomenon many times existing for years in aged persons with perfectly healthy hearts, was led to ask himself whether, at least in those cases in which cardiac lesions were lacking, the organic cause of the retardation was not in some lesion of the cervical cord or the medulla, rather than in the heart. He has seen also serious accidents occur in these conditions.

“These accidents which occur in the form of attacks repeated at varying intervals, sometimes present all the characters of syncope, sometimes their symptoms partake at once of the characters of syncope and the apoplectic attack. There are, finally, cases in which epileptiform movements, with change in the coloration of the face, foaming at the mouth, etc., occur. The pulse, which in the intervals was, on the average, 30 or 40 per minute, becomes still slower during the attacks, falling to even as low as fifteen beats a minute. It may even stop altogether momentarily. The attack always begins like syncope; the apoplectic state with stertor comes next, at the moment when the pulse, suppressed for an instant, reappears, and when the pallor of the face gives way to flushing.”

M. Charcot is led to believe that the cause of the slowing of the pulse and the accompanying accidents, must be sought for in the spinal cord and medulla.

In a recent thesis on the same subject by Dr. Blondeau (1879) we find an analysis of seventeen observations of permanent slow pulse, from which it follows that advanced age is a predisposing cause of this anomaly, all the cases being aged persons from at least fifty years to seventy and above; and that by the side of this we must place alcoholism and depressing emotions, misery, chagrins; that the duration of the accidents is usually long, varying between one and a number of years; that their termination is ordinarily serious, death occurring most frequently (10 times out of 17 cases) in a very sudden manner. The temperature is generally lowered, but the thermometric observations leave something to be desired. The respiratory disorders in some of the cases (6) apparently resembled those which, like the pupillary dilatation and vomiting observed in some of the cases, were manifestly of bulbar origin. The heart in seven cases revealed to auscultation nothing abnormal; in four cases there were simply palpitations, and in only three cases was there a little fatty alteration of the heart. Finally, in sixteen out of the seventeen cases epileptic or epileptiform attacks occurred, under the form of *grand* or *petit mal*; either the syncopal attacks preceded the convulsive symptoms, or vertiges, or fainting spells, followed by a period of unconsciousness.

Comparing these three orders of symptoms, the epilepsy, the cardiac or respiratory disorders, and the retardation of the pulse, which all appear to be factors of the same morbid condition, M. Blondeau demands whether it may not be possible to explain this

state by the existence of an alteration in the medulla, exercising on the heart a moderating influence through the pneumogastric and the cervical sympathetic.

Finally, in the article *Pouls* in the *Nouveau Dictionnaire de Médecine et de Chirurgie Pratiques*, by Dr. Aug. Rigal, the permanently slow pulse is mentioned as coëxistent with syncope and epileptiform attacks that lead us to refer all these symptoms to a disorder of medullary innervation in which an abnormal excitation of the nuclei of the pneumogastric will account for the retarded cardiac impulse, and to be considered as the indication of a condition which, with a deceptive appearance of harmlessness, frequently terminates in sudden death. We find also, in support of this theory of cardiac retardation, some observations reported by Rosenthal, and by Th. Halberton, in which slow pulse was the sequence of an interesting injury to the cervical cord, and a case of Thornton's where the same phenomenon was observed in a syphilitic female, presenting the symptoms of cerebral syphilis. We have also observations by Stokes and M. Cornil, in which the slowness of the pulse was apparently due to a fatty condition of the myocardium.

WRITERS' CRAMP.—Wernicke has lately found a peculiarity which, if present in all instances, sheds an entirely new light on this affection. In an ordinary case reported to the Berlin Physiological Society (*Arch. f. Phys.*, 1881, p. 197), he observed an isolated paralysis of the extensor pollicis longus muscle, which muscle according to Duchenne, is not immediately concerned in the act of writing. However, it is of decided influence on the position of the thumb, and hence the author believes the paralysis to be an etiological factor in the disease.

THE NEURO-MUSCULAR HYPEREXCITABILITY IN HYSTERIA.—The following is an abstract of a more extensive memoir in the *Archives de Neurologie*, by MM. Charcot and Paul Richer, which we take as published in advance in the *Gaz. des Hôpitaux*, No. 37, Mar. 29.

Among the somatic phenomena that characterize the condition of artificial hypnotism in hysterical cases, there is one that consists in a special aptitude of the muscle to contract under the influence of mechanical excitations, and which one of us, at the beginning of our researches on the subject in 1878, has described under the name of *neuro-muscular hyperexcitability* (Charcot).

Neuro-muscular hyperexcitability pertains to only one phase, or, if it is preferred, one mode, of hypnotic slumber. It is one of the fundamental characters of the artificial hysterical lethargy (*léthargie hystérique provoquée*) (Charcot). It must not be confounded with the phenomena of true catalepsy in the *état cataleptique*. Finally, there is a third form of nervous slumber, resembling more nearly the so-called "magnetic" sleep, and altogether different from the phenomenon now under consideration. The principal characteristics of these three kinds of hypnotic slumber have been described in detail by one of us in a recent memoir on hysteria epilepsy (Richer).

The muscular contraction consequent to the nervous condition designated as neuro-muscular hyperexcitability, is not merely the result of direct mechanical muscular action ; it follows equally excitations applied to the tendons or to the nerves

I. *Excitation of the tendons.* The exaltation of the tendon reflexes is one of the most constant characters of the hysterical lethargy. It may exhibit itself in two different ways :

1. By extension and diffusion of the reflex action.
2. By modification of the muscular contraction resulting from it.
 - a. The contraction is more lively without increasing in duration.
 - b. The duration of the contraction is prolonged, and there is a tendency for it to become transformed into contracture.
 - c. The contraction becomes permanent ; there is actual contracture.

These two kinds of exaltation of the tendon reflexes may exist either singly or united in the same individual.

Shock is not the only method of mechanical excitation which, applied to the tendon, provokes contracture. This follows equally simple friction or pressure.

These researches on the modifications produced in the tendon reflexes under the influence of hypnotism, tend to unite the phenomena of the neuro-muscular hyperexcitability and that of the tendon reflexes, of which it is, after a fashion, only the highest and most delicate expression.

II. *Excitation of the nerves.* The mechanical excitation of the nerves causes contracture of the muscles to which they supply branches.

Thus in exercising pressure on the ulnar nerve behind the olecranon, the hand contracts itself in a characteristic attitude, the

reason of which is to be found in the physiological action of the muscles of the forearm and of the hand innervated by this nerve, and which we may designate the *griffe cubitale*.

The same is the case with the median and radial nerves, which, when mechanically excited, cause various characteristic attitudes of the hand, explained by the distribution of the branches of these nervous trunks.

III.—*Excitation of the muscles.* The contraction that follows the direct excitation of the muscular mass is easily demonstrated. Our experiments upon the muscles of the neck (sterno-mastoid), upon those of the trunk (deltoid, trapezius, etc.), of the arm and forearm, have led us to the following conclusions :

a. Excitation applied to a limited portion of a large muscle causes contraction of the whole mass.

b. The contraction of one muscle, produced under these conditions, almost invariably causes the simultaneous action of its synergetic muscles.

IV. In the *face* this neuro-muscular hyperexcitability presents some special features. The muscles, the same as in the members, are both directly and indirectly excitable by mechanical means, but the excitation only causes a temporary muscular contraction, never a contracture.

Therefore, with ample mechanical excitation, we can reproduce on our patients the majority of the experiments of Duchenne (of Boulogne) on the partial action of the muscles of the face.

These facts we have stated are interesting in a double point of view :

In a clinical sense, we find in the regular production of these phenomena certain diagnostic signs that put the observer in position to detect simulation.

In a physiological point of view, they may aid in the solution of more than one problem pertaining to the science of life.

ALTERATIONS OF THE NERVES IN CHRONIC RHEUMATISM.—
MM. Leloir and Degerine reported to the Société de Biologie, Apr. 2 (abst. in *Le Progrès Médical*), that in case of chronic rheumatism, with considerable muscular atrophy and rapid eschars, they found the cutaneous nerves adjacent to the eschars affected with atrophic parenchymatous neuritis. They thought that the alteration in the nerves was anterior to the eschars, and saw evidence of this in the rapidity of the ulceration itself. The histological examination of the cord remained yet to be made.

DEVELOPMENT OF THE CRANIAL NERVES.—M. Mathias Duval, Soc. de Biologie, Apr. 2 (rep. in *Le Progrès Médical*), had an opportunity of studying the head of a lamb embryo at times, struck with an arrest of development. It was an *otacephalus*; the head, reduced to the middle and internal ears, seemed to have been cut by a ligature above the basilar apophysis. In a section of the encephalic stump, at the level of the fourth ventricle, the nucleus of origin, the emmentia teres, and the beginning of the facial nerve, and also the origin of the external motor oculi, were recognizable. The nucleus of origin of the trigeminus, situated in the same plane, and usually readily exposed by the horseshoe section, was absolutely invisible. What is the explanation of this phenomenon? M. Duval finds it in the study of the development of the spinal nerve-roots.

We are aware, in fact, that in the embryo, before the closure of the canal in the cord, there are to be seen two prolongations arising in its anterior portion, which are the origin of the anterior roots. Later, when the canal is closed in, there are seen starting from the posterior portion two lateral prolongations, nervoso-epithelial colonies. These diverticula become the spinal ganglia, they commence to become pediculated, then they become altogether isolated from the spinal canal, and it is only later that they send toward the cord on the one hand, and toward the periphery on the other hand, the prolongations that become the sensory roots.

For the trigeminus, in the same way, the medullary root should start from the ganglion of Gasser, which explains why, in the present instance, no trace of it could be discovered in the medulla.

TABES AND SYPHILIS.—Prof. W. Erb, *Centralbl. f. d. Med. Wissensch.*, Nos. 11 and 12, has made a recent careful study of over one hundred well-marked male cases of locomotor ataxia, and finds the result to still further confirm his previously experienced views (*Deutsch Arch. f. Klin. Medicin*, Bd. 24, 1879) as to the connection of this disease and syphilis. In the first one hundred cases he found only twelve without a previous history of syphilis or chancre; of the remaining eighty-eight, fifty-nine had had the secondary manifestations of the disease, and twenty-nine had had simply chancres. Of these last eleven had been treated constitutionally with mercury and iodide of potash, so that it is presumed that their sores were of the infecting variety; in fifteen

of the others particulars as to the nature of the sore are wanting ; in only three was it specified as a "soft" chancre. As regards the time of the first manifestation of tabetic symptoms after the syphilitic infection, the following are the facts : The symptoms of tabes developed between the

1st and 5th year in	17	cases
6th " 10th "	37	"
11th " 15th "	21	"
16th " 20th "	3	"
21st " 25th "	5	"
After the 31st	2	"
Unknown	3	"
	<hr/> 88	"

In order to meet the objection that syphilis occurred so frequently in the class of people under his observation that it might be considered as an accident always to be looked for, Prof. Erb gives a comparative statement of a similar examination to that of his tabetic patients, of four hundred of his adult male patients suffering from other affections, chiefly nervous, and finds that seventy-seven per cent. of these had no history of syphilis or chancre whatever, that twelve per cent. had had secondary syphilis, and eleven per cent. simply chancre. Thus in the general adult male invalid population under his observation, the tabetic cases excluded, only twenty-three per cent. were in any way syphilitic, while in the tabetics alone eighty-eight per cent. had a history of syphilis. "In fact," he says, "if one will not refuse all assistance from statistics and logic in the solution of this question, it must be admitted that these figures speak most emphatically in favor of the view that there is an etiological relation between syphilis and locomotor ataxia." Of course they are not absolutely conclusive, but they go far to support the author's views. It is well worth while for others who have large opportunities for observation in this line to make similar examinations. It cannot be said that if syphilis be proven to be at the bottom of most cases of this disease that its prognosis is necessarily improved, but it does not render it any more unfavorable, and it will be a very interesting practical point.

HALLUCINATIONS.—Victor Kandinsky, *Archiv f. Psychiatrie*, as the result of a study on the origin and nature of hallucinations, comes to the following conclusions :

1. Hallucinations are never the expression of an aroused activity of the psychic sphere, but on the contrary are indications of the exhaustion of the same, *i. e.*, of the cortex of the anterior part of the brain. The period of intellectual delirium does not coincide with that of hallucinations. With the arousal of the psychic activity the hallucinations become less real and disappear. The ability of the patient during convalescence to engage in intellectual work contributes largely to the suppression of the hallucinations.

2. The mechanism and origin of hypnotic hallucinations are identical with those of insane hallucinations.

3. Hallucinations are distinguishable from phantasy and recollection images, however lifelike these latter may be, by their peculiar objective character.

4. Hallucinations dependent upon irritation of the nerves of the organs of sense are characterized by their simplicity; peripheral visual hallucinations frequently possess, in addition, the peculiarity of moving in series and of following the movements of the eyes.

5. The influence of recollection and of the tenor of intellectual delirium on hallucinations is extremely slight. Indeed, in delirious or insane persons the images of the fancy are not always transformed into hallucinations.

"The only difference between my view of hallucinations," says Kandinsky, "and that of Prof. Meynert is the following: According to Meynert, hallucinations depend upon the relations of the excitation of the cortex of the fore-brain to those of the infracortical centres. It is difficult for me to accept the notion that very complicated and systematic hallucination images, consisting of numerous regularly coördinated parts, and perceived by consciousness in perfected shape (for example, a landscape with water, sky, clouds, trees, houses, etc., all in their natural colors, shades, and perspective), can originate anywhere else than in the cortical cells.

The latest researches (Ferrier, Munk, and others) have shown that there are in the cortex strictly marked-out, special sensory spheres. These cortical regions are the highest centres of sense-perception, and special conceptions. Besides consciousness and abstract thought, the function of the fore-brain includes the regularities and inhibition of the excitations coming from other portions of the cortex. The power of imagery plays a great part in our mental activities, and the function of the cortex of the

fore-brain is always accompanied with activity of the cortical sensory regions (for example, the visual or auditory centres of Ferrier). If the cortical visual centre is excited, not from the fore-brain, but from a corresponding infra-cortical centre (such as the corpora quadrigemina), then the result of its activity is not a mere imaginary object, but one that assumes an objective character, *i. e.*, there is a genuine act of vision, or, in the lack of an external impression, a visual hallucination. If the control of the cortical sensory centres by the cortex of the fore-brain is prevented, then the spontaneous excitations that go to them from the corresponding infra-cortical centres (resulting from variations of the circulation or nutrition) give rise to the occurrence of hallucinations. The conditions favorable to the latter are diminution of the activity of the fore-brain, together with an excited condition of the sensory centres, cortical as well as infra-cortical. This excitation may pass from the nerves to the infra-cortical centres, hence hyperæsthesia of the sensory organs is a common accompaniment of hallucinations. But, on the other hand, we can in no case admit a centrifugal (from higher to lower centres) transmission of the excitation.

NERVE-STRETCHING.—At the Société de Biologie, February 26th, M. P. Bert announced that he was convinced that nerve-stretching produced its effects on the cord and not on the nerve. What is it that occurs when a mixed nerve is destroyed by heat, cold, or by a caustic? Motion is first affected, while after nerve-stretching the reverse phenomenon exhibits itself. It is therefore natural to suppose that in stretching a nerve it is, in reality, the cord on which we perform the operation.

At the session of March 19th, M. Quinquaud exhibited a guinea pig, in which he had, six weeks previously, stretched the sciatic, according to M. Laborde's method, and in which the operation had been followed by trophic troubles and the spontaneous amputation of the toes to which the nerve was distributed. This is the same lesion as that produced by division of the nerve. In another guinea pig he observed a curious phenomenon to which he gave the name of *mechanical transfer*; he stretched the sciatic on one side just sufficiently to produce anæsthesia, and then repeated the operation to the same extent on the opposite side. He found then the sensibility revived and very pronounced on the

side originally operated upon. Numerous experiments gave the same results, provided that the stretching and the consequent anæsthesia were not carried too far.

This interesting phenomenon proves that we modify the activity of the nerve cells in the cord by this operation, and that we do not have to do with the results obtained from a simple nervous laceration, but with phenomena acting at a distance, like those described by M. Brown-Séquard.

TINNITUS AURIUM.—After a careful study of the subject of tinnitus, Dr. P. Hermet, *L'Union Médicale*, January 29th, February 5th, 8th, and 10th, arrives at the following conclusions :

1. That the tinnitus compared by the patients to the roaring sound of a shell, to the sighing of the wind, or to the sound of waves, is a symptom of the lack of equilibrium between the atmospheric pressure and that of the air contained in the middle ear, and is the kind experienced in cases of obstruction of the Eustachian tube, or of foreign bodies in the ear.

2. That that of which the *timbre* may be rendered by the word djiii, and which the subjects compare to the sound of a jet of steam, or the fizzling of green wood on fire, to the whistling of a gas jet running free and not lighted, is a sign of compression, met with wherever, through derangements in the chain of ossicles, the liquid of Cotugno is compressed.

This kind of tinnitus is observed sometimes temporarily in cases of foreign bodies in the meatus, and more frequently and continuous with ankylosis of the chain of ossicles, with adhesions between the tympanum and the incus, and contraction or retraction of the tensor tympani.

3. Musical sounds are always associated with an affection of the internal ear, and may be accompanied with titubation, vertigo, etc.

4. Tinnitus isochronous with the pulse and simulating a bruit de souffle, are produced by congestion of the arterioles in the handle of the malleus and vascular alterations elsewhere than in the ear.

TRANSITORY INSANITY FROM COLD IN CHILDREN.—Dr. H. Reich, of Müllheim, Baden, *Berliner Klin. Wochenschr.*, xviii, 8, 1881 (abstr. in *Schmidt's Jahrb.*, 189, No. 1), gives an account of four boys, from 6 to 10 years of age, who, after exposure to rather

severe cold weather, were seized, shortly after being placed in a warm room, with violent excitement, with hallucinations, in short, with a sort of acute mania. These symptoms lasted till near the next morning, when they fell into quiet sleep, from which they awoke perfectly sane, but with no recollection of the circumstances of the attack, and complaining of nothing except a slight temporal headache. In one case there was also clonic muscular contractions; in two, outward divergence of the bulbi; in one case, pain in the ears, changing from one to the other; and in one of the cases, severe pain in the joints. Other somatic symptoms were cyanosis of the face, heat of the head, quickened pulse, but no rise of temperature was observed during the attack.

In all four the symptoms were characteristic of true transitory mania, the sudden onset, the maniacal excitement, with delirium and sensory hallucinations continuous throughout the attack, and the whole closing with a critical slumber, the awaking finding the patient with no recollection of the seizure through which he had passed. The designation "*mania transitoria*," in the sense now applied to it in modern psychiatry, may, therefore, be properly given to these cases.

The pathology of these attacks is thus explained by the author: The exposure to severe cold (16° to 22° C. = 5.2° to 7.6° F.) for several hours had driven the blood from the periphery to the inner organs. The sudden change to a room heated by a warm stove, whether by reversing this condition and producing *anæmia* of the brain, with increase, perhaps, of the cerebro-spinal fluid and slight *œdema*, or whether by causing actual *hyperæmia*, especially of a venous nature, is uncertain, no doubt gave rise to a very marked change in the vascular condition generally, including that of the brain, enough to account for the phenomena. From their analogy to the phenomena of transitory mania caused by alcohol, emotional disturbances, etc., the author is inclined to attribute a cerebral *hyperæmia* as the cause in his cases. The symptoms of headache, delirium, hallucinations, and maniacal excitement, can, he thinks, be better explained by this than by the presumption of an *anæmic* condition. The cases fall into the general category of the already-observed cases of transitory mania otherwise induced by changes of temperature, and which have been designated as "*delirium caloricum*."

In conclusion he calls attention to the forensic aspects of these cases. They show that transitory mania may be induced in healthy persons by sudden changes of temperature, during which

acts of violence may be committed (as has been already observed in mania transitoria from sunstroke), without the patient having any subsequent recollections of the same.

ALBUMINURIA AS A SYMPTOM OF EPILEPSY.—Dr. Klendgen, Physician of the Provincial Insane Hospital at Bunzlau, ends an extensive memoir on the significance of the presence of albumen in the urine of epileptics, *Archiv f. Psychiatrie u. Nervenkrankheiten*, xi, Hft. ii, in which he discusses the subject exhaustively, with the following conclusions :

Traces of albumen are demonstrable in any urine possessing a certain degree of density.

Periodic slight augmentations of the quantity of albumen, without any simultaneous rise of specific gravity, are not so uncommon as to afford reason to be suspicious of them as symptoms of renal disease.

The urine voided after epileptic attacks exhibits no peculiarities in regard to its reaction or density.

Any demonstrable increase of albumen, due to an epileptic attack, is always very rare and slight in degree, and in male epileptics can generally be traced to the presence of semen in the urine.

Cylinders were found only once, in an epileptic suffering from nephritis, but not after attacks.

The utilization of the symptom of an increase of albumen in the urine after epileptic attacks in the diagnosis of dubious cases or those of forensic importance, as is often claimed, is clearly demonstrated to be not practicable by the above-stated results.

THE CEPHALIC SOUFFLE IN THE ADULT. In 1838 Fisher (of Boston) published in the *American Journal of Medical Sciences* a paper in which he described the *bruit de souffle* in the head, and stated that he had met with this sound in auscultation of the cranium in cases of chronic hydrocephalus, cerebral congestion, either simple or coincident with dentition or whooping-cough, in acute encephalitis or meningitis, in suppuration of the brain, induration of that organ, etc. Other authors recognized the same sound later, and reported it with other affections ; among others, M. Henri Roger, who found it only exceptionally after the closure of the fontanelles, and expressed the opinion that cranial auscultation is not really applicable to persons past the first two or three years of life. Subsequent writers to M. Roger have, as a rule, agreed

with him in this opinion, though it has, perhaps, not been altogether denied that the cerebral *souffle* might occur in the adult also.

M. Raymond Tripier, in a memoir published in the *Revue de Médecine* (the continuation of the *Revue Mensuelle*), Nos. 2 and 3 of this year, takes up the subject anew and reports six cases of the occurrence of this intracranial *souffle* in the adult, with a very thorough discussion of the conditions of its occurrence and its significance. The following are the conclusions of his memoir :

1. The cephalic *souffle* occurs in the adult as Fisher and Whitney have stated, and, contrary to the opinion of M. Henri Roger, now generally accepted.

2. I have met with it in one case of anæmia from neuralgia, in several cases of chlorosis, in one patient suffering from cachectic anæmia, in one case of intracranial tumor, and in a case of hydrocephalus.

3. It is a profound systolic *souffle* that can be heard over the whole cranium, but principally over the lateral portion at the horizon of the temples ; its maximum intensity is in the right temporal region, and it does not appear to be modified by changes of position of the head and trunk.

4. The patients in whom it occurs have no intermittent sound synchronous with the *souffle* heard on auscultation, and, consequently, with the cardiac systole, the intensity of which is in direct relation with that of the cephalic *souffle*.

5. Both this subjective sound and the *souffle* may be modified or suppressed momentarily by the compression of the carotid on the side auscultated, or even that of the opposite side. Simultaneously we observe in the anæmic patients the production of a general *malaise*, with numbness of the hand of the side opposite the compressed carotid. These phenomena are most marked, or are only produced by compression of the right carotid.

6. The cephalic *souffle* may be diminished or disappear with a cure or an aggravation of the disorder which it accompanies.

7. The cephalic *souffle*, being perfectly synchronous with the carotid systole, ought to have its origin in the arterial system. It is not due to a transmission of the systolic *souffle* of the heart that we observe in anæmic or chlorotic patients, nor to that of a *souffle* occurring in the arteries or veins in the neck. By exclusion, we locate it in the terminal portion of the internal carotid, at the point where it enters the cranial cavity. Not only are there many

reasons militating in favor of this location, but in one case there was found a small tumor, situated alongside the artery at this horizon, which gave rise to a sound altogether similiar to that found in the other cases. The *souffle* may be produced on both sides, or only on one side, and that, preferably, the right.

8. In anæmias due to hemorrhages or to cachexia, as well as in chlorosis, the cephalic *souffle* is met with when the symptoms of anæmia are especially intense and of long duration, notably when there is a very pronounced discoloration of the integuments, palpitations and breathlessness with the slightest exertion, digestive disturbances, and especially vomiting, together with great weakness.

9. In these cases there exists a cardiac systolic *souffle*, which is lacking in cases connected with an intracranial lesion.

10. A cephalic *souffle* without any corresponding sound at the base of the heart, and especially without coëxisting anæmia, ought to suggest the possibility of compressions of the internal carotid in its terminal portion, when there is no disease of the orbit.

11. The cephalic *souffle* can be distinguished by the above condition from the continuous *souffle* with reinforcements, which may appear intermittent, produced by communication of the carotid with the cavernous sinus, as well as from the intermittent *souffle* due to aneurisms of the carotid and the ophthalmic arteries, since in both these cases there are characteristic symptoms on the part of the orbit.

12. We have not met with the cephalic *souffle* in the cerebral affections mentioned by Fisher and Whitney, with the exception of hydrocephalus.

13. We have also not found it in the healthy adult.

14. Is there a continuous cephalic *souffle*? We have not met with it in the adult. But the patients may hear sounds that are probably venous *bruits*, either continuous or intermittent, but which must not be confounded with those accompanying the cephalic *souffle*.

15. The cephalic *souffle* may afford important indications for the diagnosis, prognosis, and the treatment of the disease in which it occurs.

HAIRY GROWTHS IN INSANE FEMALES.—Dr. A. McLane Hamilton, *N. Y. Med. Record*, March 12th, in a paper read before the N. Y. State Medical Society, Feb. 1st, calls attention to abnormal

hairy growths in insane females as connected with their mental affection. He divides the subject of abnormal hairy growths into two groups :

1. Those in whom trophic cutaneous changes, such as acne, depositions of pigment, lesions of the nails, or hang-nails, as well as slight hairy growths, occur in young women in connection with ovarian irritation, and with mental trouble or emotional disturbance, evidenced by melancholia and perverted moral sense ; the altered sexual state being often connected with masturbation.

2. Those cases in which prolonged vaso-motor changes have existed, and in which uterine and ovarian functions have disappeared.

From time to time Dr. Hamilton has observed insane women with beards or growths of hair, and most of these cases presented some history of sexual trouble, and in nearly every case the growth of hair was coincident with the onset of the mental disorder. At first he did not attach much importance to the phenomenon, but of late he has been inclined to attribute to it, in its connection with some other conditions, as important a significance as to the condition of the hair of the insane mentioned by Bucknill and Tuke, and Darwin. He has investigated the matter in the Blackwell's Island Lunatic Hospital, and found many cases illustrating his views. He reports several cases, and terminates his paper with the following conclusions :

1. "Abnormal growth of hair, especially upon the face, is frequently closely connected with disturbed functions of the pelvic organs of women.

2. "That in the insanity of women, especially when it relapses into dementia, and cutaneous nutritive changes exist, such growths of hair are by no means of uncommon appearance.

3. "That their unilateral character, as far as preponderance in growth is concerned, and their association with unilateral cutaneous lesions, such as bronzing and nail-changes, indicate their nervous origin.

4. "Their appearance chiefly upon the face in insane patients, and relation to trophic disorders incident to facial neuralgia, point to the fifth nerve as that concerned in the pathological process.

5. "The development of hair with the deposit of pigment, and skin lesions, and occasional goitrous swellings, suggests the inference that the neuro-pathological process, which leads to the growth of hair in the chronic insane, is akin to that which gives rise to Addison's disease.

"As I have said, there are many cases which do not impress us, because they include women of advanced age. These I exclude altogether, but I shall be satisfied if I succeed in convincing my hearers that when any considerable growth of hair occurs upon the face of female insane patients, it is indicative of an unfavorable form of insanity, and such especially is the case in those women who have not reached middle age."

UNILATERAL TRISMUS. The only case of unilateral trismus recorded, says the *Detroit Lancet* man, has been observed by Dr. Thenee, Elberfield (*Intern. Jour. of Med. and Surg.*, January 15, 1881; *Berlin. Klin. Wochenschr.*, No. 37, 1880). It was caused by an injury to the nasal bones, denuding them of their periosteum, produced by a fall. It was accompanied by facial paralysis of the same side, and continued four days. The other side then became involved, and the patient died next day.

The above case is certainly not the only one on record, as stated, though the unilateral symptom does not appear to have been observed in many cases. But in a paper on the "Pathology of Tetanus," in this JOURNAL for Jan. 1876, Dr. H. M. Bannister reports a case in which the trismus was at the beginning unilateral, and on the side of the face opposite to the injury that originated the disease. He then expresses the opinion that this phenomenon is in accordance with the theory of the involvement of the higher centres in the disorder. It is probable that the unilateral tonic spasm, in most cases where it occurs, is of very short duration, and that the tetanus becomes symmetrical at a very early period, probably as soon as or before the disorder is correctly diagnosed. Dr. Thenee's case is, therefore, chiefly remarkable for the duration of this phase of the attack.

THE INITIAL SYMPTOM OF TABES. Fr. Müller, *Brochure*, Graz, 1880 (abstr. in *Centralbl. für Med. Wissensch.*, January 8th), has noted the following in the initial stage of locomotor ataxy: In twenty-one observations, he observed eight times a sudden and unilateral paralysis of accommodation, which was corrected by convex glasses, and which generally, even if bilateral, disappeared in a few weeks. This may be the only symptom of commencing tabes, but it is more frequently with paralytic mydriasis. Spinal myosis was entirely lacking in four of the twenty-one cases. An early and constant symptom is reflex pupillary rigidity, which was

lacking in only three out of seventeen cases examined in this particular. The atrophy of the optic nerve, connected with disseminated sclerosis is, according to Müller, to be distinguished from that due to tabes, by the fact that in it, with decided impairment of vision, the color-sense is retained intact. In four cases out of his twenty-one, the author found a retardation of pain-conduction, but he found much more common and early to appear was a decrease of the sense of pressure. Although he considers the absence of the patellar tendon reflex as an early symptom of the disorder, yet he finds it now and then retained with well-marked disease of the posterior column. In the vegetative sphere the author noticed the obstinate gastric catarrh, independent of indigestion or chilling, that had been previously described by Erlenmeyer, and, further, the presence of profuse perspiration of the feet, occurring even before the fulgurant pains, but which, later, disappeared altogether. As to whether articular or osseous disorders belong to the primary (the author adds "and rarest") symptoms of tabes or not, the opinions of other observers must be considered. In regard to the therapeutics, he agrees with most other authorities in recommending the application of the constant current, of moderate strength, along the spinal columns, with baths of from 89° – 78° F., with corresponding frictions, and nitrate of silver and ergot internally. He does not recognize a causal nexus between syphilis and tabes; only when the symptoms of syphilis are manifest the specific treatment should be employed.

THE GAIT IN CHRONIC ALCOHOLISM. Westphal, in the *Charité Annalen*, calls attention to a peculiar gait which he has observed in two cases of chronic alcoholism. This anomaly consists in the fact that the patient, in carrying forward the foot lifts the limb to a considerable height at the hip joint; while, at the same time, the leg remains flexed at the knee joint, and the foot is allowed to fall upon the ground with a quick, abrupt movement, as in stamping. The gait here described, though similar in regard to the motion at the hip and knee joints, differs from that in paralysis of the peroneus muscle in these respects: that the foot does not hang down, the point of the foot is not trailed forward, the manner of placing the foot is not the same, and the dorsal flexion of the latter is strong. Those suffering from *tabes*, also flex the limb markedly at the hip joint, but their gait differs from that under discussion, by the extension and hyperextension of

the leg, and the swinging of the lower extremities. It is possible that a portion of the disturbance may be due to the existing sensation of painful tension in the calf and knee joint. An impairment of the sensibility and of muscular irritability was not observed. According to Westphal's experience, this abnormality of gait in chronic alcoholism is not frequent. *The International Four. of Med. and Surgery*, February 19, 1881.

The following are some of the recently published articles on the pathology of the nervous system and mind, and pathological anatomy :

BRAMWELL : The differential diagnosis of paralysis, *Brain*, April, 1881. RINGROSE ATKINS : Case of paretic dementia, *Brain*, April, 1881. ASHBY : Case of injury to the left frontal lobe, *Brain*, April, 1881. BEARD : A case of prolonged trance, *N. Y. Med. Record*, May 7. BRAMWELL : Clinical lectures on intracranial tumors, *Edinburgh Med. Journal*, March and May, 1881. BEARD, G. M.: Mesmeric trance, *Boston Med. and Surg. Jour.*, March 24th. WOOD, H. C.: On hystero-epilepsy and hysterical rhythmical chorea, *Phila. Med. Times*, Feb. 26th. DA COSTA, J. M.: On arsenical paralysis, *Ibid.*, March 26th. COFFIGNY, J. O.: On Jacksonian epilepsy, *Cronica Med-Quir. de la Habana*, Feb. BULL, C. S.: Some points in the pathology of ocular lesions of cerebral and spinal syphilis, illustrated by cases, *Am. Jour. of Med. Sci.*, April. ARNOLD, A. B.: Neuralgia, *Maryland Med. Fourn.*, Jan. 15th. VALIN, H. D.: Report of three peculiar cases of paralysis, with recovery in each case, *Chicago Med. Fourn. and Ex.*, March. ROGER, H. V. DAMASCHINO : The alterations of the spinal cord in infantile spinal paralysis and in progressive muscular atrophy, *Revue de Médecine*, No. 2, Feb. 10th. CROTHERS, T. D.: Some of the problems of inebriety, *N. Y. Med. Record*, April 9th. STEWART, T. G.: On paralysis of hands and feet from disease of nerves, *Edinb. Med. Jour.*, March. BOOTH : Case of traumatic facial paralysis, *Edin. Med. Fourn.*, June, 1881. HAMMOND, W. A.: Cerebral embolism, *Gaillard's Med. Fourn.*, May, 1881. WOOD : Case of severe injury to the brain, with recovery, *Am. Fourn. Med. Sci.*, July, 1881. McDOWALL : Large calcareous tumor involving chiefly the inner and middle portions of the left tempero-sphenoidal lobe, and pressing upon the left crus and optic thalamus, *Edin. Med. Fourn.*, June, 1881. MANN : Pathology and treat-

ment of chorea, *Coll. & Clin. Rec.*, May, 1881. MICKLE: On general paralysis of the insane, consequent to locomotor ataxy, *The Lancet*, May 21 and 28, 1881.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

VOMITING OF PREGNANCY.—Dr. J. S. Warren, *N. Y. Med. Record*, March 26th, considers the vomiting of pregnancy due to various influences, mental ones included, and to remedy it requires a careful diagnosis of its cause, whether it be simply reflex, or due to some other organic condition. Its treatment, therefore, resolves itself into the correction of all disturbances, functional or organic, as far as possible, which are known to excite dyspeptic symptoms, before a simple irritation becomes a confirmed gastritis, and the stomach rejects the remedies that would most easily relieve the original disorder. First among these, Dr. Warren recognizes a constipated habit and the emotional element, and these, he holds, should receive prompt attention in pregnancy. The latter of these is, he says, relieved by no remedies more generally than by the bromides of potash and soda, given, as a rule, in full doses late in the day, on an empty stomach. Constipation can be overcome by any simple laxative. After these, the purely sympathetic disorder must be attended to if vomiting persists. The most patent remedy for this, in his experience, is Fowler's solution, in drop doses, on an empty stomach. When thus given with a restricted diet, it has seemed to him nearer a specific for this complaint than any other medicine. After it has been used for a while it may be found of advantage to suspend it and use nitromuriatic acid, with tinc. nucis vomicae, especially if there is any inactivity of the liver or kidneys, or if anorexia exists.

STATIC ELECTRICITY.—The following are the conclusions of an article by Dr. W. J. Morton (*N. Y. Med. Record*, April 2d and 9th) on the therapeutic use of Franklinism, or static electricity.

First.—Static electricity as a curative agent in medicine may fairly be placed on a level with galvanism and Faradism. In certain diseased conditions it is superior to either.

By insulation and sparks paralyzed muscles and nerves are stimulated, just as by induced currents.

Second.—The main objections to static electricity are based upon the inconvenience, the working uncertainties of the apparatus, and the difficulty of measuring and controlling the electricity administered.

These objections fail to have weight with the use of a modern improved Holtz machine, and a proper electrometer.

Third.—Insulation and sparks, both or either, more notably sparks, relieve cutaneous anæsthesia more quickly than galvanism or Faradism. In hemiplegia with organic lesion, numbness and anæsthesia is at once relieved by this treatment.

Fourth.—Decided motor improvement may be obtained in hemiplegia of long standing. The dragging of the toe, the tread on the outer side of the foot, the outer swing to the leg, the rigidity at the knee, elbow, and shoulder, may all be, to a very apparent degree, and often entirely removed.

The contracture at the wrist and fingers is incurable.

Fifth.—In paraplegia and systemic diseases of the spinal cord in general, there is every reason to expect that by means of long and strong sparks to the spine results not now attainable may be reached.

A distinguished and careful observer,* familiar with the treatment by sparks, thinks that "patients suffering from paraplegia, who are now benefited by the constant current, were previously cured by static electricity."

Sixth.—In the sense that medicines are tonic, the positive electrical insulation is tonic.

Seventh.—Statistical electricity by insulation and sparks is principally useful in conditions of paralysis, spasm, and neuralgia, and preëminently in subacute and chronic rheumatic affections, whether tendinous, fascial, or muscular.

Eighth.—Static electricity cures disease, as other forms of electricity do by stimulations of nerves and muscles, organs and nerves of special sense. It likewise cures, by aid of the spark, in virtue of a sharp, deep, mechanical agitation of the diseased tissue, acting in this instance like physical exercise and massage, by causing alteration of nutrition.

But above and beyond these methods of curative action is the principle, as lately established by Brown-Séquard, of reflex action

*Dr. Wilks, a physician of long experience at Guy's Hospital, London, where statistical electricity was formerly largely used.

in remote parts by peripheral irritation of the terminal distribution of the sensory nerves. In electrification by insulation, electricity of high tension is actively accumulating on and beneath the skin, *i. e.*, the nerve distribution, and as actively discharging: the effects of static electricity are then in this instance produced from the periphery; and owing to the fact that the electrification is general and the tension high, no other form of electricity offers equal promise in the treatment of diseases or conditions that can be affected either in a sedative or stimulating manner from the general peripheral nerve distribution. The recent experiments of Brown-Séquard lead us to believe that many diseases may be thus acted upon.

Ninth.—The invention by the author of a method of obtaining an interrupted static induction current from a frictional electrical machine, adds to medical electricity a new and practical means of electrical treatment.

This current is more agreeable in its administration than ordinary induction currents. Both nerves and muscles are stimulated by it to a higher degree than is possible by means of any other induction current now in use, and a corresponding advance in the efficacy of electrical therapeutics in these two directions may be confidently expected.

The new current, furthermore, greatly enlarges the scope of static electrical machines in medicine by combining in a single machine all the advantages both of static and induction electricity.

ELECTROTHERAPY OF THE BRAIN.—The following is a translation of a short article by Dr. Leopold Löwenfeld, in the *Centralblatt für die Med. Wissensch.*, No. 8, February 19th.

Up to date there have been published no actual experimental researches on the action of the electrical current applied through the integument, in a longitudinal or transverse direction through the head, on the circulation within the cranial cavity. The only previous investigations, especially upon the action of an electric current passed through the head, on the cerebral (meningeal) vessels, are those of Legros and Onimus, and Latourneau. Legros and Onimus (*Traité d' Electricité Médicale*, Paris, 1872, p. 197) trepanned a dog and passed the current from a battery of ten Remak cells through the brain, applying one pole to the denuded brain and the other to a wound in the neck in the neighborhood of the superior cervical ganglion. They found with the descend-

ing current, a contraction, and with the ascending current, a dilatation of the vessels. Latourneau (*Gaz. Hebdom.*, 1879, No. 40), with the assistance of Laborde, performed a single experiment : in a five-weeks-old kitten he applied the positive pole of a battery of eighteen elements (Onimus-Brewer) behind the ascending ramus of the lower jaw, and the negative pole to the forehead. He observed the vessels of the dura mater (?), and after ten to fifteen seconds saw contraction of the arteries and later of the veins. With every interruption (reversal ?) the anæmia increased for a moment, after which the vessels slowly dilate again. The contraction of the vessels could be produced at will in the denuded pia mater. I have repeated Latourneau's experiment, and have obtained, in place of the expected contraction, a dilatation of the vessels, and this with the same location of the poles. Hence the importance of Latourneau's experiment is by this much lessened.

I have performed a large series of experiments to ascertain, on the one hand, facts relative to the action of therapeutic currents applied percutaneously on the cerebral circulation, and, on the other hand, to establish a basis, though a narrow one, for the electrotherapy of the brain. In these experiments I used forty animals, thirty of them rabbits. In most cases, the effect of currents directed in longitudinal and transverse directions percutaneously through the head was studied, but a number of experiments with the arrangement of Legros and Onimus (one pole on the neck and the other on the denuded brain) were instituted.

The most notable results of these experiments can be stated as follows :

1. A descending current (positive pole to the forehead, negative pole to the neck) causes a contraction of the arteries of the pia.
2. An ascending current (positive pole to the neck, negative to the forehead) causes dilatation of the arteries.
3. With a current sent transversely through the head, there is dilatation of the arteries on the side of the anode, and contraction on that of the cathode.
4. Induction currents carried through the head in a longitudinal direction cause increase of the amount of blood in the brain.

This last point requires a still further study. It appears that the action of the induction current, like that of the constant current, is not restricted merely to the dilatation of the vessels.

BROMIDE OF ETHYL.—The following are the conclusions deduced by MM. Bourneville and H. d'Olier from a series of researches on the physiological and therapeutic effects of bromide of ethyl, published in the *Progrès Médical*, March 28th.

1. The pupillary dilatation at the beginning of the inhalation of bromide of ethyl is not at all constant.
2. Complete muscular resolution is the exception.
3. The anæsthesia produced varies to a large degree in different subjects.
4. The temperature, the secretions, and the general condition appear to undergo no modifications.
5. The pulse and the respiration are slightly accelerated.
6. A tremor, more or less pronounced, of the members may be produced during the inhalation, but it does not persist beyond this.
7. Hysterical attacks are generally easily arrested by the bromide of ethyl.
8. Epileptic attacks may sometimes be cut short by giving the drug during the tonic period, but more frequently the inhalations are ineffectual.
9. In epilepsy the regular employment of bromide of ethyl, administered in daily inhalations during a period of two months, notably diminished the frequency of the attacks.

ANÆSTHETICS.—At the session of the Société de Biologie, February 26th (reported in *Le Progrès Médical*), M. P. Bert announced the results of experimentation with various anæsthetics on dogs, squirrels, etc., which are noteworthy. The anæsthetics employed were ether, chloroform, amylene, chloride of methyl, and bromide of ethyl. The method of experimentation was as follows: The dog being tracheotomized, he introduced into the canula the short branch of a Y tube. The two equal branches are furnished with two *soupapes*, opening in the opposite direction; by the one enters air containing a known quantity of anæsthetic vapor, and through the other departs the product of expiration. He found that with the same quantity of pure air, say one hundred litres, and with animals of the same species, whatever their size or strength, the weight of the anæsthetic liquid, the vapor of which is mixed with one hundred litres of air, is always the same at the moment when anæsthetic sleep appears, and at the moment when death occurs the amount of the anæsthetic has reached another

fixed amount; in a word, that the *zone maniable* in a given quantity of air is fixed for each anæsthetic. In the dog, 37 grains of ether are needed for each 100 litres of air to cause anæsthesia, and 74 grains to cause death; if chloroform is employed, the figures are 15 and 30 grains; if amylene, 30 and 55 grains; if bromide of ethyl, 22 and 45 grains; and if the gas chloride of methyl, 21 and 42 cubic centimetres are required for 100 cubic centimetres of air. It follows from this that the *zone maniable* varies from the single to the double to cause anæsthesia or death.

In the usual method of inducing anæsthesia with the saturated compress or the sponge, we always play, so to speak, with a mortal dose. When we bring the compress from 3 to 6 centimetres of the face the result just varies between the single and the double. How much better to so regulate the operation as to administer a dose corresponding to the medium figure of the *zone maniable*. In the dog, if we give at once 45 grains of ether, inspired in 100 litres of pure air, anæsthesia is produced at once without accident, and the sleep lasts for a long time. It is, therefore, not necessary to say that 30 or 50 grains of an anæsthetic were used during an operation; these figures signify absolutely nothing, since it is not the absolute quantity that is important, but the tension of the vapor of the anæsthetic in the inspired air, and consequently the quantity contained in the blood.

The practical application of the above is clear. If the limits of the *zone maniable* of an anæsthetic be known for man, it will be enough to lay aside all fears of asphyxia, and to cause to be inspired a mixture perfectly adapted and prepared in advance in any recipient whatever.

PHOSPHIDE OF ZINC IN LOCOMOTOR ATAXY.—Dr. Hastings Burroughs (*Medical Press and Circular*, February 9, 1881) gives this drug in one-eighth-grain pills, one a day for a week, and then two daily, and so on up to five. He has treated his cases successfully thus far. *Phila. Med. Times*, March 12th.

ALCOHOL.—Dr. M. Dumouly, *Brochure*, Paris, 1880, from experiments performed under the inspiration of MM. Sée and Bochefontaine, at the laboratory of the medical clinic of the Hotel Dieu (abstr. in *La France Médicale*), concludes that alcohol in small doses aids digestion, while in larger quantity it hinders it. It is not an aliment but a *substance d'épargne*, a waste-

decreasing agent. It accelerates the respiration, and, with large doses, causes a slight acceleration of the pulse. In moderate doses it is a stimulant, in large ones a depressant, to the nervous system.

As regards its action on the temperature, alcohol in very large doses causes a considerable reduction ; in small doses, exceeding twelve grains, the reduction is only some tenths of a degree Centigrade, this temporary effect being in no measure influenced by digestion. In very small doses, between six and eleven grains, M. Dumouly obtained a rise of two- or three-tenths of a degree. Below six grains there was no appreciable effect. Curiously enough, the dose of twelve grains seemed to be intermediate, and gave rise to no effect whatever.

In point of view of pathology and therapeutics, alcohol acts in pyrexias as a stimulant ; it is a powerful remedy against delirium and adynamia. Large doses (thirty grains of pure alcohol) produce in fever cases a slight refrigeration of a few tenths of a degree. This effect is transitory ; its maximum occurs in an hour and a half, and it is completely over in three hours. Divided doses do not have this temporary effect. The action of alcohol on the pulse is very slight. Large doses fail to produce intoxication in the febrile patient, while they surely have this effect on the healthy individual.

En résumé, if alcohol has any effect in fever, it is not as an antipyretic, as is generally thought to be the case.

NERVE-STRETCHING.—M. Quinquaud reported to the Société de Biologie, Mar. 12th (abstract in *Gaz. des Hôpitaux*, No. 32), that he had observed a certain number of facts that indicated that the therapeutic effects sought for can only be obtained when there is produced a complete anæsthesia of the whole limb supplied by the nerve ; that it succeeds only when this anæsthesia is persistent, and, finally, that the principal indication for nerve-stretching is neuralgia.

Next, taking up the subject histologically, he asked what was the process taking place in the elongated nerves ? There is, first, according to him, a dynamic action ; an irritation of the nerve itself or of the cord.

When the anæsthesia obtained is only temporary there is no lesion of the stretched nerve. When it is persistent there is a secondary degeneration of the nerve. This is an incontestable

fact, that when a nerve is sufficiently stretched it becomes the seat of a secondary degeneration.

At the same meeting M. Laborde presented a memoir of M. Marcus on the subject. The author had studied the anatomical modifications in the stretched nerve. When a nerve, stretched during life, is submitted to the action of osmic acid, it is seen that the cylinder axis is separated from the myeline by a yellowish substance, and the usual signs of nerve degeneration are observed. In the cat, especially, M. Marcus found the exact place in the nerve where stretching had been applied eight days after the operation. The lesions always existed in the central portion of the nerve. The effects obtained are quite different according as the traction is made on the central or the peripheral portion of the nerve. In the former case we only abolish sensibility, motility remaining intact, while in the latter case both are destroyed.

In reply to questions, M. Laborde stated that while the lesions of the central portion were very slightly marked, it was not astonishing that the peripheral portion remained intact; and that as regards the persistence of motor power with the degenerative changes observed, it could be explained by the fact that, in a stretched mixed nerve, the sensory roots would be affected while the motor ones would remain intact. It is certain that the elements of compression of the nerve must also be considered, and the phenomena showed relations with those obtained by MM. Bastian and Vulpian by compressing the nerves.

At the session of the Soc. de Biologie, Apr. 22d (reported in *Gaz. des. Hôpitaux*), M. Quinquaud reported that in his observation he had found that a spinal epilepsy, analogous to that following section of the cord or the sciatic nerve, might result from simple nerve-stretching. In his experiments he produced epilepsy by irritating or pinching the epileptogenic zone of Brown-Séquard on the same side as that of the stretching, sometimes on the opposite side. If the stretching was done on the right or left side the spinal epilepsy followed irritation of this zone on the right or left side; but irritation of the right side only produced epilepsy of the right side; it was needful to apply the irritation anew to the left side to cause the convulsions on that side; it reached its maximum in the posterior member of the same side, rarely in that of the opposite side.

This spinal epilepsy is not constant, and its course is yet obscure; nevertheless, it is rational to admit that nerve-stretching acts powerfully upon the spinal cord, of which we have further proofs in the following facts :

The stretching of a nerve may cause functional disorders in the corresponding nerve of the opposite side ; these are sometimes phenomena of arrest, sometimes those of dynamic hyperexcitability. Thus, if the right sciatic be stretched, anæsthesia is produced not only in the sphere of the right nerve, but also in that of the left crural, and sometimes in the region innervated by the right crural or the left sciatic. When the stretching has been sufficient, the anæsthesia is persistent in the last two toes innervated by the elongated right sciatic, while the anæsthesia produced in distinct parts is transitory.

The same effects may occur in the nerves of the anterior limbs. They may be observed also in the fore limbs after stretching the nerves of the posterior ones ; the modifying influence on the cord, therefore, traverses a certain distance in that organ.

Moreover, even insufficient stretching causes, first, an anæsthesia, the duration and intensity of which are proportional to the amount of stretching ; if the latter is slight the anæsthesia will soon disappear, if it is moderate the duration will be longer, and if it is forcible the anæsthesia will be persistent, as has been shown by M. Laborde.

In cases where the anæsthesia is of only short duration, it is not uncommon to see produced a hyperæsthesia, either direct or in the region of a distant nerve.

Moreover, after the operation, there always exists a certain degree of paresis ; the posterior member, for example, drags as if the cord had been divided, thanks to the crural nerve, which innervates a larger part of the muscles of the hind limb.

Finally, when, after having caused an experimental neuritis or even a perineuritis, we stretch the nerve, we produce anæsthesia ; but this quickly disappears, so that in these conditions a much more forcible elongation of the nerve is required to produce a lasting anæsthesia than is the case with a healthy nerve.

M. Quinquaud has likewise observed various trophic disorders following this operation. All these facts have their clinical bearings, which he will dilate upon in a future communication.

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Original Articles.

DEFORMITY OF THE HAND AS A SYMPTOM.

By R. W. AMIDON, M. D.,

NEW YORK.

IT was when studying the bewildering array of chronic invalids under Prof. Charcot's care at the Salpêtrière that the following article was conceived and the material for its composition, in great part, collected. Not long after, the writer met with the excellent thesis of Meillet,¹ which has been of inestimable value as the only book of reference on the same subject.

An article on this subject may well be preceded by a few words on the normal position and appearance of the hand. The normal position of the hand depends on two important factors; first, the extreme mobility with the force of gravity, and, secondly, the resultant of the tonicity of antagonistic muscles. Each group of muscles moving the hand and fingers has its direct antagonist in some other group. Thus, flexors antagonize extensors; pronators antagonize supinators, and abductors antagonize adductors. Living, healthy muscle always has a certain tonus, which, together with the

¹ Des Déformations Permanentes de la Main au point de vue de la Séméiologie Médicale, par H. Meillet, *Thèse de Paris*, 1874.

tonus of its antagonist, keeps the part moved by these muscles steady and ready at the shortest notice to obey the impulse of the will or of reflex excitation.

The best example of this is the head, which, during waking hours, is balanced by the conjoint action of the neck muscles, but the moment the muscles lose their tonicity at the onset of sleep the equilibrium is destroyed and the head obeys the laws of gravity and nods. As in the neck, so in the hand the muscles keep it in a certain attitude.

The usual attitude of the human hand at rest is that of pronation and slight flexion of the wrist and semi-flexion of the fingers, while the thumb is dependent and slightly inverted, so as to make its palmar aspect face very nearly the pulps of the fingers.

Now, this normal attitude of the hand may be changed in four ways.

1. A certain muscle or set of muscles may undergo atrophy, whereupon the antagonists of the same, which retain their tonus, will distort the hand in various ways.

2. Nearly the same thing occurs when a muscle or set of muscles is paralyzed without atrophy.

3. A spasmodic state of certain muscles may distort the hand by destroying the equilibrium of the muscular groups.

4. Anatomical, pathological changes may take place in the framework of the hand itself, through which vicious attitudes may arise.

Thus deformities of the hand may be, for convenience, divided into four classes.

1. Atrophic deformities.
2. Paralytic deformities.
3. Spasmodic deformities.
4. Deformities of purely local causation.

I.—ATROPHIC DEFORMITIES.

Under this head will be first described the hand of progressive muscular atrophy. The fully-developed muscular atrophic hand presents the deformed condition called commonly "*main en griffe*," or the claw-like hand. This deformity is by no means suddenly acquired, and in many cases of progressive muscular atrophy is never reached. In almost all cases, however, atrophy invades the hand somewhat, and a more or less perfect "*main en griffe*" results. When the disease invades the hand the patient notices that the hand easily tires and its capacity for finer movements is impaired. Soon the patient notices a falling away of the thenar eminence, and, from this time on, the atrophy extends, involving finally both thenar and hypothenar eminences, the interosseous and lumbrical muscles. The atrophy of the muscles of the thenar eminence and of the first interosseous space causes the thumb to separate from the hand and rotate on itself so as to make its palmar surface look in nearly the same direction as that of the fingers instead of in the opposite. This, together with the loss of the hypothenar eminence, gives a flat look to the hand, which causes it to be called "*la main de singe*," or the monkey hand. When the atrophy has reached and destroyed the interosseous muscles the typical "*main en griffe*," or claw hand, results. The trapezium and uniform processes of the carpus stand out in relief. The normal thenar and hypothenar eminences have given way to hollows in which the angular outlines of the first and fifth metacarpal bones are readily made out. The palm is hollowed out and very concave, and the interosseous spaces, instead of bulging as they should in the well-formed hand, are sunken and show the outlines of the metacarpal bones on both the dorsum and in the palm.

The first metacarpal bone is drawn toward the same level as the others, and is rotated outward on its longitudinal axis. Moreover, the antagonists of the thenar muscles cause the thumb to assume still further a vicious attitude. The extensor ossis metacarpi pollicis draws the metacarpal bone out, while the flexor longus pollicis being stronger than the extensor secundi internodii pollicis, the two phalanges of the thumb, especially the second, tend toward flexion, thus giving the thumb very much the appearance of the fourth toe of birds.

The atrophy of the interosseous and lumbrical muscles leaves no antagonists to the long extensors and flexors, hence the former extend the first phalanges, while the latter flex the second and third.

Together with the deformity of the hand its intrinsic movements are restricted. Abduction, adduction, and opposition of the thumb are impossible. Flexion of the first and extension of the second and third phalanges, and ab- and adduction of the fingers are impaired in proportion as the atrophy of the interossei and lumbricales is partial or complete.

When these muscular changes have existed a long time there ensues a change in the fibrous elements of the hand, which seems to fasten it in this unnatural position and to prevent, even by the exercise of considerable force and the production of a great deal of pain, even a temporary return to its normal shape.

The description of the "main en griffe" as above given is by no means a constant sequel of progressive muscular atrophy, and for the following reasons. It is rare for the atrophy to be complete in the hands before it invades other parts, and if the long extensors and flexors of the fingers in the forearm are atrophied a typical claw hand cannot result.

Again, the atrophy may commence in some other part of the body, and the patient may die with the hand nearly normal or only slightly involved. Hence we more often see the "main de singe" (monkey hand) in progressive muscular atrophy, while the typical "main en griffe" is better exemplified in some cases of nerve injury or disease, as in leprosy.

The points in the differential diagnosis between this deformity and others resembling it are, first, the retention, to the last almost, of farado-contractility of the muscles; secondly, the common involvement of both hands; thirdly, the existence of atrophy in some other part of the body; fourthly, the progressive tendency; fifthly, the absence of anæsthesia, and also the clinical history. From the atrophy following any other spinal lesion or any cerebral lesion it is distinguished by the fact that it is preceded and accompanied by no paralysis or anæsthesia. From the atrophy following nerve injury it is distinguished by the facts, first, that its atrophy has no regular distribution, while that following nerve injury is confined exclusively to the physiological distribution of the injured nerve; secondly, because it was preceded by no paralysis and accompanied by no anæsthesia. From the atrophy following neuritis it is told by reason of the absence of pain and anæsthesia, and by its irregular distribution, the atrophy in neuritis, as in nerve injury, being localized. From the occasional atrophy following lead-poisoning it is distinguished by the absence of paralysis, by the electrical reactions, and by the absence of a history of plumbism. From the atrophic hand of pachymeningitis cervicalis and leprosy it is easily told by its clinical history.

The history of the patient, whose hand is represented, is here inserted, as it is, in the most important details, a typical history.

The patient was Marie A. T——, St. Alexandre Ward of the Salpêtrière Infirmary¹; 40 years old; a maker of fringes. Her occupation called for continual use of the hands and the pressure of a round handle in the palm of the hand a good deal. About a year ago she noticed that when her hands were a little chilled it was very hard work to use them unless she rubbed them very hard.

Very soon she noticed decided loss of power in the hands, and asserts that at this time there was slight formication in the parts. Next she noticed a wasting of the thenar eminence of both hands, more marked in the right. A little later the hypothenar eminences began to fall away, and the interosseous spaces became sunken, and the hand gradually assumed a claw-shaped appearance. Of late shoulder movements have become difficult. She denies ever having had pain.

May 17, 1880. Present condition: Atrophy of muscles of hand, forearm, arm, and shoulders. More marked, however, in the hands, whose thenar and hypothenar regions are very flat, and whose interosseous spaces are sunken. The left hand, in particular, has assumed a partial "main en griffe" attitude. (See fig. 1.)

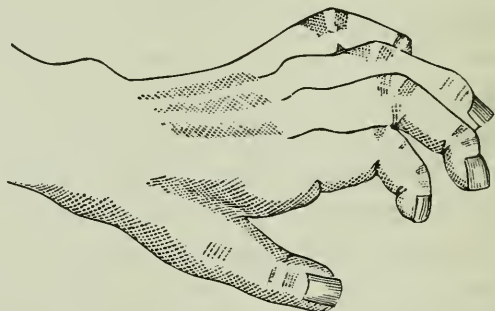


FIG. 1.—Left hand of Marie A. T——. A case of common progressive muscular atrophy.

The thumb is abducted and drawn back on a plane with the rest of the hand, while the last phalanx is flexed. The first phalanges of the fingers are slightly extended, while the second and third are slightly flexed.

Voluntary movements of the atrophied parts are very restricted, especially those of abduction and adduction, extension of the last

¹ Service of Prof. Charcot.

phalanges of the fingers, and opposition of thumb. All vigorous efforts in that direction result in increased extension of the first and flexion of the two last phalanges. Complete closure of the hand is also impossible. As yet no rigid fixation has taken place, so passive movements can be made, although they are rather painful to the patient.

There is no impairment of sensibility, no tendon reflex in the hands, and an abnormally marked one at the knees.

Lower extremities are intact, and all the bodily functions are normal.

The next atrophic deformity of the hand described will be that of leprosy—*morphœa alba* or *lepra anæsthetica*. The hand of this disease when it is fully developed is a typical “*main en griffe*.” The hand is entirely deprived of its fleshy covering, and the bony prominences and tendons everywhere show through the tightly drawn skin. The thenar and hypothenar eminences have vanished, the interosseous spaces are sunken, and the palm is extremely hollow. The hand is slightly extended, the thumb is rotated outward, its metacarpal bone is extended and its two phalanges flexed. The first phalanges of the fingers are extended, while the second and third are generally flexed, and in an advanced stage completely and tightly flexed. The long flexor tendons in the palm are very prominent and extremely tense. The hand is held very rigidly in this attitude, and, as might be well imagined, its intrinsic movements are almost, if not entirely, abolished. It is in this deformity of the hand, in particular, that some change takes place in the fibrous and articular apparatus of the hand which renders a restoration to its original attitude, even by force, almost impossible. With these atrophic changes there are apt to be ulcerative or tubercular affections about the fingers, and an impairment or, in many cases a complete loss of general sensibility in the parts. This form of leprosy, which receives its name be-

cause when fully developed the patient presents on various parts of his body patches of skin, large or small, generally white, which are entirely devoid of sensibility, is endemic chiefly in Egypt and Arabia, but is also known in almost all equatorial countries; also in more temperate countries, as Turkey, Greece, China, and even in some high latitudes, as in Norway and Sweden. In our country and France only imported cases are seen, and it was from an Egyptian who attended Prof. Charcot's clinic that the following history and sketches were taken. For the history I depend on my own notes taken at the time and a full account of the case which appeared in the *Progrès Médical*, Dec. 25, 1880, reported by Ballet, interne at the Salpêtrière.

The patient, H. F., male, twenty-four years old, was born at Cairo, Egypt. He had no hereditary taint. The disease commenced at the age of eighteen. For many years before the patient had led a very dissipated life. He drank regularly about two litres of *raki* a day, besides a large quantity of wine, cognac, and absinthe; he consumed, besides, an enormous quantity of hashish; he smoked about fifty cigarettes a day, each containing fifty centigrammes of Indian hemp, and ate a pastile of the extract, weighing 1.50; he also carried sexual intercourse to a wonderful excess. The disease commenced by anæsthesia of the lower extremities; then the head and neck lost sensibility, and then the neighborhood of the nipples. Two years later the hands commenced to atrophy. Examination of the patient reveals the existence of large plaques surrounded by a slightly elevated border, which is strongly pigmented. The skin in these zones is completely anæsthetic. One comprises the head and neck, two more each arm and shoulder, a small one surrounds each nipple, while another comprises the external genital organs. A very pronounced atrophy affects all the muscles underlying the anæsthetic areas.

The atrophy is very marked in the feet, legs, forearms, and hands, and also in the face, particularly the orbicularis palpebrarum, occipito-frontalis, and zygomaticus major.

This facial atrophy gave a peculiar facies, as there was inability to close the eyes tight, and the atrophy of the oral muscles gave

the patient a particularly woe-begone expression. There was an ulcerative keratitis with pannus in both eyes. As for the hands, which concern us particularly, they had lost about all their intrinsic muscular substance (see fig. 2), the thenar and hypothenar eminences had disappeared, and the interosseous spaces were

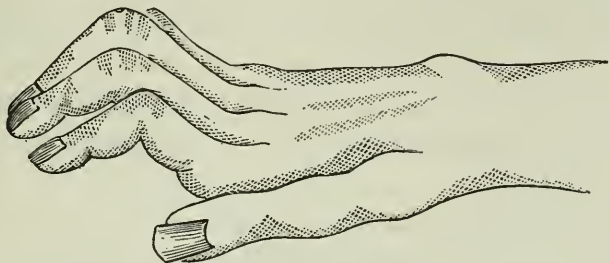


FIG. 2.—Right hand of H. F. Case of morphœa alba.

very hollow. The hand had assumed an almost typical “main en griffe” attitude, and by local changes was pretty tightly held in this position. The intrinsic movements of the hand were of course impossible. The patient could write his name by holding the pencil stiffly between his index and middle fingers, and by moving the hand as a whole.

The results of a careful electrical examination by Dr. Vigouroux showed that there was no response to either current where the atrophy was well marked, but that in a few muscles, as the peronei and the pyramidalis nasi, there was degeneration reaction to the galvanic current.

This deformity of the hand is easily distinguished from any other by the history, by the anæsthetic patches on the body, and particularly by the anæsthesia of the hands.

In myelitis of the anterior horns in the cervical region of the cord we have often a condition of the hands which, perhaps more nearly than any other, resembles the hands of muscular atrophy. Like it the atrophy is generally bilateral, and generally accompanied by no impairment of sensibility of the part; but unlike muscular atrophy that of myelitis is preceded by paralysis, and generally attacks

groups of muscles or whole extremities, while muscular atrophy may invade and destroy a part of a muscle and leave the rest intact. In the hand of cervical paraplegia, also, we get a loss of farado-contractility and a degeneration reaction to galvanism.

The deformity resulting from myelitis of the anterior horns varies from a simple atrophy of the larger groups of muscles to a total atrophy of all the hand muscles. When the thenar eminence is atrophied we get simply the monkey hand, which is quite common, and when the other intrinsic muscles are involved there results a more or less complete "*main en griffe*," modified in many cases by a paralysis or paresis of the long flexors or extensors in the forearm.

The deformity of the hand, resulting from a common myelitis, differs in no way from that of myelitis of the anterior horns, except it is accompanied by anæsthesia. The man whose history and a sketch of whose hand is annexed, had a cervical myelitis chiefly confined to the anterior horns, but undoubtedly implicating the sensory zone somewhat, as evidenced by the sensory disturbance in one of his arms. His history was as follows:

P. C., male, forty-eight years old,¹ March 30, 1880, when intoxicated, went to sleep on the floor of a cold room, in a draught. He was perfectly well at 12 o'clock, when he fell asleep. At 4 A. M., when he awoke, he found his arms were powerless from shoulders down, and that he had no sensibility from just above the elbows down to the fingers. Two weeks later he could move the right index finger slightly, and at the same time sensibility had gradually reappeared in the whole arm, last in the right medius, which was also the last to regain its power of motion. When first seen, June 2, 1880, the patient could use his right hand a little, but there still remained a slight amount of numbness and sense of powerlessness. The left arm was quite helpless from the shoulder down, and there was no sensibility from a little above

¹ Service of Dr. Seguin, Manhattan Hospital.

the elbow to the finger tips. The muscles were flabby and degenerated, and when asked to raise the arms only the trapezius acted on either side. There was the reaction of degeneration in some of the muscles of the right upper extremity and in almost all of the left upper extremity. He was treated systematically with electricity for months and nothing new developed, except the knowledge that he had been subject to fits of psychical epilepsy for years.

At the time the accompanying sketch was made (see fig. 3) the right arm, forearm, and hand had entirely recovered,

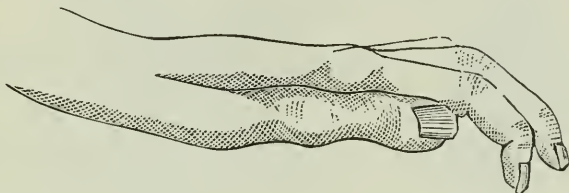


FIG. 3.—Left hand of P. C. Case of cervical paraplegia.

and the condition of the left was as follows: There still remained some atrophy in the suprascapular muscles. The arm muscles were nearly normal, but the forearm muscles responded poorly to faradism, and with a slight degeneration reaction to galvanism. Voluntary motion was possible in all parts above the wrist. There was no voluntary contraction of the intrinsic muscles of the hand, and in fact little of these muscles remained. Thenar and hypothenar eminences were gone, and the interosseous spaces were sunken. The extensor tendons stood out on the back of the hand, while in the palm the long flexor tendons were very salient. The position assumed was rather that of the "main de singe" than the "main en griffe." The thumb had receded to the plane of the fingers, but the first phalanges, except those of the ring and little fingers, were not so much extended as is usual in the claw hand. The joints were still mobile. Whatever reaction is present at all in the hand is a well-marked degeneration reaction to a

strong galvanic current, although at times a slight response has been noticed to a very strong faradic current in the first interosseous muscle.

Sensibility is still poor in the forearm and almost nil in the hand, only the strongest faradic current being felt. Very often the galvanic application he now has (negative pole,

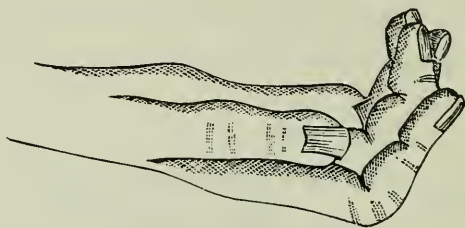


FIG. 4.—Right hand of case of cervical paraplegia in the service of Prof. Charcot at the Salpêtrière.

labile) will bring out on the left arm and forearm a beautiful urticaria rash which lasts only a few minutes. At other times a fine, red, papular eruption follows the same application.

In amyotrophic lateral sclerosis there is generally first a spasmodic and then an atrophic deformity of the hand, but as the atrophic deformity is most often seen and more permanent it will be introduced here. The course of the disease is so typical that only a *résumé* of its symptomatology need be given. The patient complains of weakness, formication, numbness, or perhaps muscular pains of the upper extremities. Fibrillary twitchings, atrophy, and progressive paralysis soon follow. There may be, and generally is, before the paralysis and atrophy have advanced far, a contracture of the hand and fingers due partially to unopposed action of muscle still remaining healthy, but also to a true spasm of some muscular groups. There is adduction of the arm, semiflexion and pronation of the forearm, semiflexion of the wrist and fingers. Later in the course of the dis-

ease, after the atrophy and paralysis have progressed, this spastic condition generally relaxes, sometimes completely, and there remains the "main en griffe" or "main de singe." At a variable length of time after the onset of symptoms in the upper extremities walking becomes difficult. The legs feel heavy, the feet drag, and the patient frequently

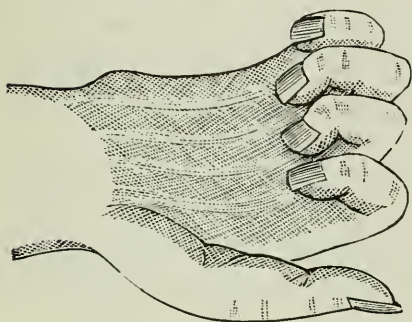


FIG. 5.—Right hand of Louisa ——. Case of amyotrophic lateral sclerosis.

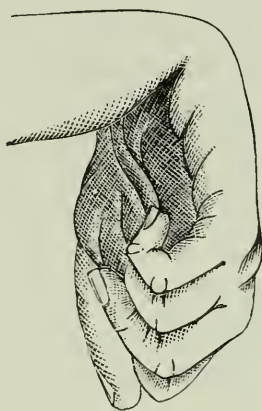


FIG. 5a.—Forearm and hand of Charcot's case of amyotrophic lateral sclerosis.

falls. There exists, particularly in the legs, a muscular hyperæsthesia, and the patient has attacks of "spinal epilepsy," brought on by movements or contact, and consisting of jerking, adduction of the thighs, and crossing of the feet and legs. Soon now the patient becomes bed-ridden, and the stiffness of the legs becomes permanent. Paralysis and muscular atrophy soon set in but are never so marked as in the arms. The head is bent forward, often so that the chin touches the sternum, and the spine is very rigid. At last labio-glosso-laryngeal paralysis sets in and death soon results.

The patient from whom fig. 5 was taken had entered the third and last stage of the disease, and her hand, as figured, was more atrophic than spastic. She was an embroiderer, æt. 49, and entered the St. Luke ward at the Infirmary of the Salpêtrière Nov. 13, 1878.¹ This case had followed the

¹ Service of Prof. Charcot.

typical course, and her condition when the hand was figured was as follows :

She was bedridden. The face had a grinning demented look. Eyes staring, brows elevated, corrugators contracted, mouth half open, lips drawn and stiff ; saliva dropped almost constantly from the mouth. Tongue was incapable of protrusion, thick and rough ; articulation was impossible, deglutition was difficult, regurgitation through nose, and frequent choking fits occurred. The head was pretty rigidly flexed on the chest. The upper extremities were not very rigid, but helpless ; the lower extremities were rigidly extended, adducted, with the feet in extreme talipes equinus. The sensibility was good, voluntary motion was almost nil, and the reflexes enormously exaggerated all over the body. The patient was very emotional, and simpers and cries easily. The atrophy was chiefly confined to the upper extremities. The hands, especially the right (fig. 5), were very much atrophied. All the fleshy eminences were gone, the palm was very hollow, and the fingers were spasmodically flexed into the palm. The hand itself, unlike Charcot's case, was about on a line with the forearm.

The only hand that amyotrophic lateral sclerosis could be confounded with, is that of progressive muscular atrophy or cervical paraplegia. The rapid progress of the disease and the existence of a spasmodic element would exclude the former, while the absence of complete paralysis and the preservation of farado-contractility of the muscles would exclude the latter disease.

The clinical history of the disease is so typical that a mistake is scarcely possible.

To exemplify the deformity of the hand which results when the spasmodic element predominates, there is inserted a figure 5½ from Charcot,¹ which he describes (p. 235) thus : " The arm is adducted and the shoulder muscles resist abduction. The forearm is semiflexed and pronated ; supination and extension are difficult and painful. The hand is semiflexed and the fingers are flexed on the palm."

¹ *Leçons sur les Localisations dans les Maladies du Cerveau, etc.*, Paris, 1876, p. 234.

In the hypertrophic cervical pachymeningitis of Charcot a peculiar deformity of the hand results, a description of which, as the writer has never seen a case, will be presented as given in the writings of Charcot, Jeoffroy, and Hallopeau.

The disease is generally divisible into two stages—the painful period and the paralytic and atrophic period. The disease commences by severe pains in the occiput and back of the neck, much aggravated by pressure on the spinous processes. These pains often radiate over the head, down the back, and down the arms, and there are, besides, frequent rheumatoid pains in the shoulders and elbows. The neck is kept rigid as in Pott's disease.

With these pains the patient complains of formication, numbness, and perhaps of some anæsthesia in patches, in the hands particularly. Bullous or pemphigus eruptions are sometimes seen. There are cases, however, in which the pain is chiefly peripheral, and confined almost entirely to the articulations. Sometimes a true remission intervenes between the two periods. This remission is not constant, however, and the two periods merge one into the other.

After a longer or shorter painful stage, two to three months, the patient notices a weakness and uselessness of one or both upper extremities. Very soon an atrophy commences in the hands and extends to the forearms. The muscles often more paralyzed and atrophied are the intrinsic hand muscles and the flexors of the fingers and hand. The pronators of the forearm generally suffer with the flexors. This leaves the extensors and supinators the only healthy muscles, and their unopposed action produces the deformity of the hand named by Charcot "*la main du prêcheur emphatique*," which presents the following characteristics: The hand is extended and supinated. At

times all the phalanges are somewhat flexed. At other times the fingers are extended. The thumb is applied to the side of the hand and slightly flexed. The hand itself is almost devoid of muscular covering. This atrophy and paresis generally soon invade the thoracic muscles, and in this way sometimes causes death. Of course when the secondary descending changes invade the lower cord, the lower extremities may become paraplegic with vesical and rectal complications, or tetanoid symptoms will develop as in descending degeneration from other causes.

This disease can be hardly confounded with any other, and may with certainty be distinguished from amyotrophic lateral sclerosis by the history of the painful stage, by the disseminated patches of anæsthesia and the occasional eruptions, and also by the entire absence of bulbar symptoms. The accompanying figures are copied from the works of Charcot, Jeoffroy, and Meillet.

The following is a *résumé* of the case whose hand is depicted, taken from the monograph of Jeoffroy. (See fig. 6.)

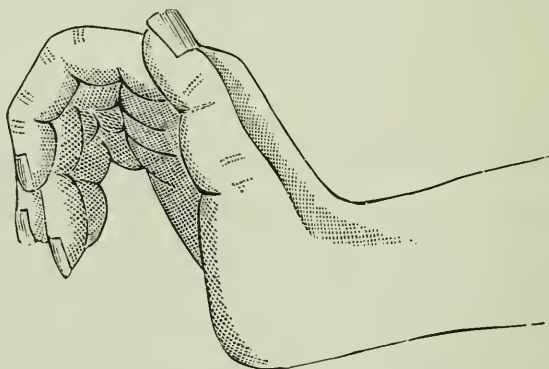


FIG. 6.—Right hand of Charcot and Jeoffroy's case of hypertrophic cervical pachymeningitis.

On Aug. 6, 1865, this woman, 29 years old, was exposed to cold and wet. During the next 48 hours she had repeated chills. At

that time sharp pains commenced in both right extremities, chiefly in the course of nerves and in the joints.

In the middle of September the pains invaded the left side. At this time fibrillary movements were noticed in the right upper extremity.

Two weeks later there was noticed a difficulty in raising the right arm, in opposing the thumb and in ad- and abduction of the fingers. Atrophy had already set in in the region of the deltoid and in the intrinsic muscles of the hand.

In April, 1866, the right elbow was semiflexed, the forearm semipronated, the wrist semiflexed, and the fingers flexed in on the palm. This contracture could be voluntarily overcome by an effort of the will.

A month later contracture appeared on the left side. There were diminished electro-contraction and lowered temperature in the affected parts. The 12th of December all contracture had disappeared, and paralysis of the previously contracted muscles was marked.

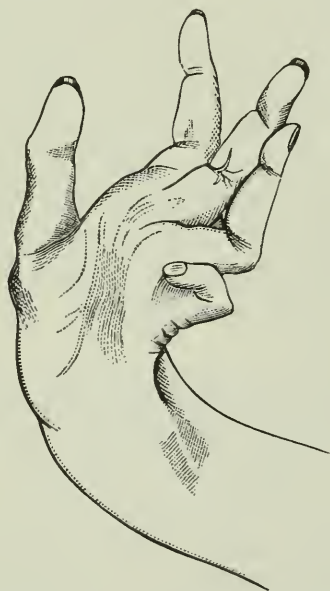


FIG. 7.—Left hand of another case of hypertrophic cervical pachymeningitis under Prof. Charcot's care. Taken from Meillet's monograph.

Early in 1868 the patient came under the care of Prof. Charcot at the Salpêtrière. She was very emaciated and bed-ridden from

weakness and contracture of the legs. The left upper extremity was atrophied and flaccid, the right hand was extended at a right angle to the forearm, and the thumb was also extended, except the terminal phalanx, which was semiflexed. The fingers which could still be extended are flexed on the palm. The forearm was flexed on the arm and the arm was adducted. All voluntary movements were abolished. There were some fibrillary contractions in the left hand. There was much anæsthesia, more marked on the right side. Electro-contractility was preserved, but quantitatively changed.

As deformities of the hand resulting from disease or injury of a peripheral nerve present many of the same characteristics a few words will be said about them together, and then special mention will be made about each variety.

Whether the nerve be injured by a neuritis, a neoplasm, by prolonged pressure, by bruising, laceration, or section, and the injury result in a local disorganization, or any change which completely destroys the conductibility of the nerve fibres, the same results ensue. First, of course, there is a paralysis¹ and anæsthesia in the peripheral distribution of the injured nerve bundle. Next the muscles supplied by the nerve, being cut off both from their motor and trophic centres, atrophy, if the separation be complete, entirely; and, lastly, changes take place in the skin of the affected part, due to the anæsthesia and the cutting off of the trophic supply.

The limitation of all these changes to the exact distribution of the nerve injured, distinguishes the deformities due to changes in a peripheral nerve from any other. If regeneration of the nerve take place soon, the part may return to its normal condition, but when regeneration is slow or absent, degeneration of the muscular substance ensues, and we find they respond in an abnormal manner to

¹ The temporary deformities caused by the paralysis of the first stage of nerve section, etc., will be mentioned when speaking of paralytic deformities of the hand.

galvanism. The trophic changes occurring after nerve injury are various. The skin is thin and smooth. The fingers are often clubbed, and the nails curved and frequently rough and brittle.

If there be much anæsthesia, as there usually is, the patient will frequently mechanically hurt the anæsthetic parts in various ways, or burn or freeze them, and troublesome indolent ulcers will result.

The distribution of the affected nerve is often the seat of sharp, tearing or burning pains, which are excessively harassing to the patient. One of the most common atrophic deformities of the hand due to nerve injury is that caused by contusion at the elbow, or by section of the ulnar nerve at the wrist. The ulnar supplies, in the forearm, the flexor carpi ulnaris and the two internal portions of the flexor profundus digitorum; in the hand, all the muscles of the hypothenar eminence, the adductor pollicis, the inner head of the flexor brevis pollicis, the two inner lumbricales, the two inner interosseous spaces entirely, and the others either alone or in conjunction with the median nerve. Variations from this distribution are uncommon but not unknown.

The deformity resulting from a destructive lesion of the ulnar nerve at the elbow, or above is called the ulnar griffe (griffe cubitale of the French). The griffe consists, first, in marked prominence of the unciform, pisiform, and third and fourth metacarpal bones, owing to an atrophy of the muscles of the hypothenar eminence, the interossei, and two inner lumbricales. Secondly, in some want of fulness about the first interosseous space and thenar eminence, owing to the atrophy of the adductor pollicis and the inner head of the flexor brevis pollicis. The vicious attitude the hand assumes is first, perhaps, a slight extension of the hand on the forearm, with a slight depression over the site of the flexor carpi ulnaris and that of the outer half of the flexor

profundus digitorum in the forearm. The first phalanges of the ring and little fingers are slightly extended, because the long extensors of the fingers are no longer resisted by the lumbrical muscles.

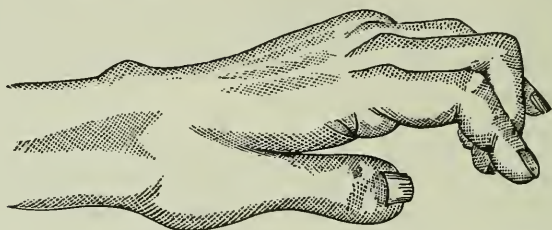


FIG 8.—Left hand of patient E. H., with section of the ulnar nerve at wrist.

Their third and second phalanges are flexed by the flexor sublimis digitorum, there being no antagonists where the third and fourth interossei are paralyzed and atrophied.

The medius has generally much the same deformity as the annulus, but the index often has its normal position and motion, because its intrinsic muscles are, in most hands, supplied by the median nerve. The thumb retains its power of opposition while it has lost that of adduction and partially that of flexion.

After injury to the ulnar at the wrist the same state of things exists except there is no paralysis of the flexor carpi ulnaris, or of the outer half of the flexor profundus digitorum. The presence or absence of this paralysis has little effect on the resulting deformity, and so we see in all cases of ulnar injury a sort of “main en griffe,” with contracture more marked in the ring and little fingers.

The following case came to the clinic of Dr. Seguin at the Manhattan Hospital, March 2, 1881. (See fig. 8.)

E. H., a janitress, forty-nine years old. Nine months before, while washing windows, she pushed her left hand through a thick pane of glass, and on the sharp, fractured edge cut the flexor

ulnar side of her forearm, near the wrist, to the bone. Immediately after the injury she noticed a prickling sensation in the ring and little fingers. Later they became swollen and painful. The cut healed in two weeks. At the expiration of that time, when the hand was taken off the splint, the patient asserts that the hand was flat and the fingers crooked. On examination it was seen that the eminences were flat. The two distal phalanges were flexed. The thumb was abducted and semiflexed. The hand was somewhat swollen and the skin in great part smooth. The finger tips, particularly that of the annulus, were clubbed and the nails curved. There was almost complete paralysis of the intrinsic muscles of the hand. There was fair sensibility to painful impressions in the distribution of the ulnar nerve, but tactile sensibility was very poor. There was no reaction in any of the hand muscles to faradism, and degeneration reaction in all except, perhaps, in those of the second interosseous space, where An C C and Ca C C were about equal.

Injury to the median nerve at the wrist results in a deformity of the hand, of which the following case is so perfect an example that it will be immediately introduced. (See fig. 9.)

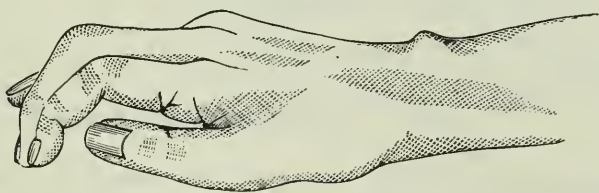


FIG. 9.—Right hand of C. K., with section of median nerve at the wrist.

C. K., a laundress, twenty-two years old, came to the clinic of Dr. Seguin at Manhattan Hospital, May 11, 1881. Three months before, while washing, she pierced her right palm with a needle. Suppuration followed, and on the fifth day two incisions were made, the one on the anterior surface of the wrist without question severing the median nerve. Three weeks later she first noticed anæsthesia in the index and middle fingers and on the pulp of the thumb.

At the time of examination there were anæsthesia, smoothness of the skin, and marks of burns and injuries in the median distri-

bution. There was some falling away of the thenar eminence, a tendency toward extension of the first phalanges of the index and medius, and flexion of their last two phalanges. The intrinsic movements of these fingers are limited, if at all present. The thumb is adducted and has lost its power of opposition. The ring and little fingers are in normal position and of normal appearance.

The deformity resulting from musculo-spiral nerve injury will be mentioned under the head of paralytic deformities.

In injury to the brachial or axillary plexus (see figs. 10 and 11) hand deformities result, varying of course according as all or only few of the cords of the plexus are injured. The manifestations are not apt to be restricted to the distribution of any one nerve, and the more common result of such injury is a general wasting and a common "main en griffe," as in the following case:

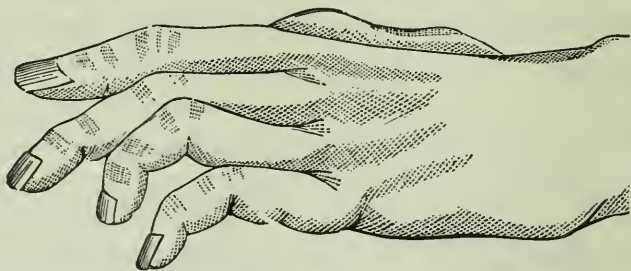


FIG. 10.—Left hand of Dr. Seguin's case of injury to the brachial plexus. Ulnar filaments chiefly involved.

A woman, forty years old, in the St. Jacques ward of the Infirmary of the Salpêtrière,¹ a tailoress by occupation, when twelve years old dislocated her right shoulder. Since then it has been dislocated six times. The last dislocation occurred two and a half years ago, and was treated at Lariboisière. Then the patient noticed for the first time that her hand was getting thin and that there was a very pronounced atrophy of that side. When examined, May 15, 1880, there was some rigidity of the right shoulder. No atrophy of the shoulder, arm, or forearm muscles. Apparently

¹ Service of Prof. Charcot.

complete atrophy of all the intrinsic hand muscles. The thenar and hypothenar eminences were wanting, the interosseous spaces sunken, and the palm hollow.

The thumb was extended and rotated inward, the first phalanges were extended, the second were flexed, and the third about straight.

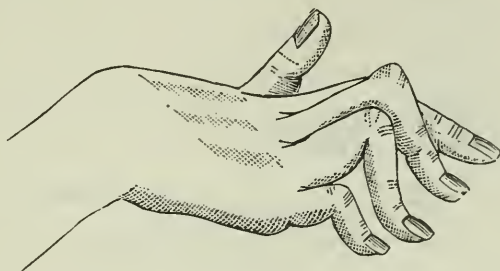


FIG. 11.—Right hand of Prof. Charcot's case of injury to the brachial plexus.

This case is not a typical one of nerve injury, as its course was not marked by pain or much impairment of sensibility.

The deformity resulting from neuritis differs in no way from that of nerve injury, but the clinical history is different, the severe pain particularly characterizing the first stage of neuritis.

The electrical reactions are the same as in nerve injury, and there commonly is anæsthesia.

K. G., a domestic, thirty-two years old, came to the clinic of Dr. Seguin at the Manhattan Hospital, Aug. 4, 1880.

For two years she had had occasional pain over brachial plexus (right side). She had had no injury to shoulder. May 11, 1880, she cut her right thumb. It bled little, but that night the thumb was the seat of much pain, which by the next night had extended to the palm of the same hand. Later the pain ran from the thumb up the flexor surface of the forearm, and then the fingers began to flex until they acquired the position now occupied by them, they never having relaxed. The severe pain lasted about three weeks, but ever since there have been occasional twinges in the hand. There was at one time considerable swelling of the palm, but there were no indications that any suppuration took place.

On examination it was seen that the fingers of the right hand were semiflexed, fixed, small, smooth, and provided with new nails. There was some atrophy of the eminences, and movements of fingers were restricted. (See fig. 12.)



FIG. 12.—Right hand of K. G., a case of neuritis.

2.—SPASMODIC DEFORMITIES.

We now come to speak of spasmodic deformities of the hand, and of these the most common and well known is the permanent contracture of hemiplegics.

In a large proportion of cases of hemiplegia of cerebral origin, at the expiration of from one to three months, a variable degree of descending degeneration in the lateral columns of the cord has taken place. This lateral sclerosis is a lesion which irritates the cells in the anterior horns of the spinal corn, and in this way greatly heightens the reflex irritability of the spinal cord and increases muscular tonus on the paralyzed side. As a result of this certain muscular

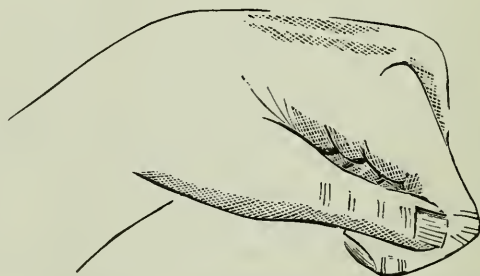


FIG. 13.—Right hand of a patient with common hemiplegia in the service of Prof. Charcot.

groups on the heretofore relaxed and paralyzed side, generally the flexors, pronators, and adductors in the upper extremity, and the extensors and adductors in the lower extremity, take on a spasmodic action which results in the condition called permanent hemiplegic contracture.

That it is a purely reflex condition is proven in many ways, but principally by the fact that the contracture is increased by the application of any local irritation to the part, cold, electricity, a rapidly vibrating body, pressure, pain, etc., etc., and by any effort to use the part, and that when the part is quiet and warm, as during sleep, the contracture may disappear, or at all events become less.

This contracture is, as a general thing, accompanied by no atrophy, and by only slight trophic changes in the part. As a rule it is permanent, but it sometimes spontaneously disappears and leaves the part flaccid.

Hemiplegic contracture of the hand varies considerably, but it generally consists in flexion of the hand, inversion and flexion of the thumb, and flexion of the fingers into the palm (see figs. 13, 14, 15). This contracture may vary in

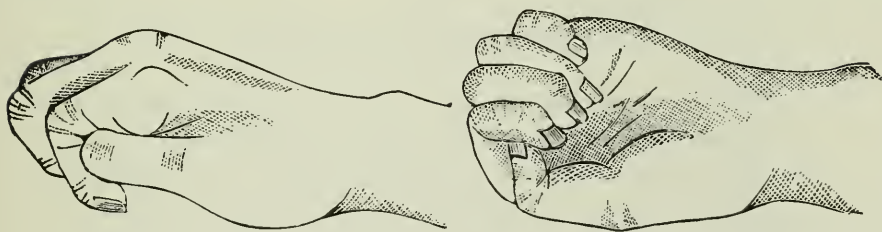


FIG. 14.—Right hand, and Fig. 15, left hand of common hemiplegics under Professor Charcot's care.

severity from a gentle shutting of the hand to the closure of the fist like a vice, and a deep indentation or puncture of the palm by the nails of the flexed fingers (see fig. 16). This spasmodic condition of the flexors can be overcome by the exercise of considerable force which gives the patient a

good deal of pain. Many hemiplegic contractures, as before said, relax of themselves when external irritations are reduced to a minimum, as during sleep. There is no atrophy or even emaciation. The hand is, as a general thing, well nourished, but, more from disuse than any thing else, the skin is generally smooth and thin; sensibility is, as a general thing, preserved, and reaction to faradic electricity is retained; there may or may not be complete paralysis in the contracted part.

As said above, a voluntary effort to use the part increases the contracture. Not only this, vigorous voluntary movements of the opposite hand, particularly flexion, also increase the contracture.

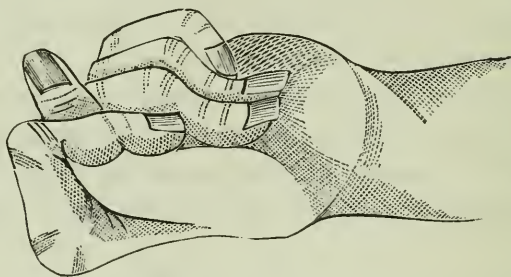


FIG. 16.—Left hand of a demented hemiplegic under Professor Charcot's care.

This constitutes the phenomenon known under the name of "associated movements," and is present in many cases of hemiplegia where no contracture exists. Hemiplegic contractures are so common that no time will be given to the narration of a case, but several figures will be introduced to demonstrate their different phases.

When a destructive cerebral lesion causing hemiplegia occurs in very early childhood, the limbs on the paralyzed side seldom, if ever, attain the same development as those on the other side. There may also be left a spasmodic or a paralytic deformity. Of the latter we will speak later on,

of the former now. This peculiar deformity is designated as that produced by cerebral atrophy.

In the infant, as in the adult, hemiplegia generally develops contracture. The position is also generally that of pronation and flexion of the hand and flexion of the fingers. In young children the osseous, cartilaginous, and ligamentous structures of the wrist joint are soft and malleable, so to speak, and the result of a long continuance in a vicious position is a permanent change in the articular structures, rendering a normal attitude and movement of the hand almost impossible. The deformity of the hand resulting is generally as follows (see fig. 17). The forearm is semiflexed



FIG. 17.—Right hand of John M—, Dr. Seguin's case of infantile hemiplegia and cerebral atrophy.

and partly pronated, the hand is strongly flexed on the forearm and is generally inclined more to the ulnar side, while the fingers are generally slightly, if at all, flexed on the palm.

Extension of the wrist is almost impossible, the palmar edge of the carpal bones having become thin, and very likely the articular end of the radius being also bevelled off on its palmar aspect. The hand is smaller than its fellow, and may or may not show some general atrophy. Voluntary movements will be very restricted, while there may be athetoid movements and very surely associated movements in the deformed hand. Sensibility is generally preserved and electro-contractility (unless there be atrophy) normal.

The following case is typical:

John M., 21 years old, came to the clinic of Dr. Seguin, at the Manhattan Hospital, Aug. 9, 1881.

The mother states that soon after the birth of the child she noticed he had strabismus. When the child was about four months old she began to notice a weakness of the right arm and leg.

When three years old the child had two fits in rapid succession. Three years later he had another fit, and since then he has had typical epileptic attacks at intervals of six or eight weeks to the present time. The hand has been contracted for many years.

Examination revealed that there was a slight ptosis of the right eye, which was in external strabismus. The pupils were equal and optic nerves normal. The tongue deviated toward the right side, and the right face was weak. The walk was pretty good, but hemiparetic. There was no talipes. There was marked atrophy in the extensor region of the right forearm, and when the forearm was flexed the hand and fingers were in the attitude called "*cou de cygne*," which has been already described. An attempt to extend the wrist causes flexion of the fingers, and *vice versa*. There are the usual hemiplegic reactions to electricity, and there is no anæsthesia. The hand is much smaller than its fellow and is very weak.

The next spasmodic deformity considered will be hysterical contracture. Like all other hysterical manifestations it conforms to no regular laws. The more common form resembles, in a great many particulars, a hemiplegic contracture. The forearm is generally firmly flexed and supinated. The hand is sharply flexed, more toward the ulnar side of the

forearm. The thumb is inverted and the fingers tightly clenched into the palm of the hand.

Forced extension of the fingers is accomplished with great difficulty and with apparent pain to the patient, and when they are released they instantaneously return to their former position. The contracture can also be reduced by very strong faradization of the extensors, by static electricity, and by the magnet, as shown in the case submitted later. There is no atrophy, no trophic change, no loss of electro-contraction in the hand or forearm. There is, however, often a local or hemi-anæsthesia, achromatopsy, and loss of the senses of smell and taste on the same side with the contracture.

The history often reveals other hysterical manifestations, as convulsions, ovarian symptoms, globus, etc., etc., which, together with the other symptoms, will serve to distinguish an hysterical contracture from any other.

Sometimes there is contracture of one finger or the thumb only, as in a case reported by Dr. Adam. The case occurring in Charcot's service at the Salpêtrière, and so ably treated and reported by Dr. Vigouroux, will be given in detail, as it is typical.

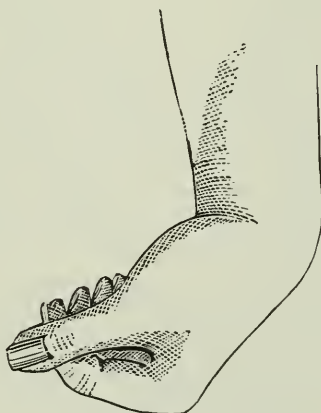


FIG. 18.—Left hand of Pauline J., Professor Charcot's case of hysterical contracture.

The patient was Pauline J.,¹ twenty-six years old, of large frame, ruddy complexion, muscular, and rather masculine in build, and left-handed. There were no antecedents. She began to menstruate at seventeen. The menses were always regular, but preceded by lumbar and hypogastric pains. July 17, 1874, while menstruating, sat in a cold place when overheated, and had a violent chill, accompanied by general hyperæsthesia. She was put to bed, when a violent headache came on. The chill lasted two hours, but the sensation of cold continued till a fever, with delirium, came on, which lasted eight days. The headache lasted fourteen days. After the headaches came hypogastric pains, with a sense of constriction, accompanied by retention of urine. The first attack lasted forty-eight hours, and these attacks occurred frequently in the next three years, four or five times. This attack was replaced by attacks of incessant vomiting. In November, 1877, one evening, she felt a numbness of the left hand, and on trying to raise it it fell inert. That night a sort of coma came on and lasted three days, preceded by intense headache. Nine days of somnolence, with headache, followed. The flaccid left hand soon began to grow rigid, and in three weeks it was closely shut. The patient had noticed a feebleness of the left leg, also; she had become emotional and had acquired a globus. She never, however, had any regular hysterical attacks.

On admission,² June 3, 1878, the left hand was flexed at a right angle, and the fingers were tightly flexed on a roll of linen held in the palm. The elbow and shoulder joints were mobile, but could not be voluntarily moved. There was no atrophy, and farado-contractility was retained. There was complete anæsthesia of the entire left upper extremity. The left half of the face was analgesic. The left ear, affected with tinnitus, was deaf. The left eye perceived colors, but had diminished acuity of vision. Smell was diminished and taste abolished on the left side. Pressure on the vertex and all down the spine was very painful. There was pain—made worse by pressure—in both ovarian regions.

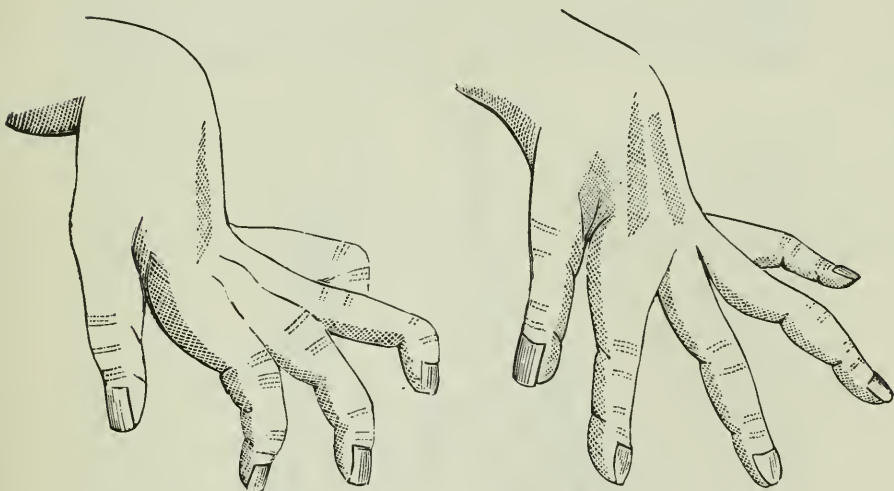
Suffice it to say that various experiments were tried with the electro-magnet, solenoid, common magnet, galvanic, faradic, and static electricity, and finally a course of treatment was commenced by repeatedly producing a contracture on the right side with a

¹ Contracture hystérique du poignet gauche. Traitement par la production artificielle répétée d'une contracture du poignet droit. Disparition de la contracture primitive. Applications variées de l'électricité. Par le Dr. Romain Vigouroux. *Prog. Méd.*, 31 août, 1878, p. 679, *et seq.*

² Service of Professor Charcot.

strong magnet, which finally left the patient, July 23d, with no contracture, no anæsthesia, and with slight voluntary movements of the left fingers and wrist.

The ultimate recovery of the left upper extremity was apparently perfect. In the spring of 1880, however, the contracture and anæsthesia reappeared, and the patient returned to the clinic of Professor Charcot for treatment, and it was at that time (May 10, 1880) that the accompanying drawing was made. There was anæsthesia of the left upper extremity, no voluntary movements below the elbow, no atrophy, flexion of wrist to about a right angle, and tight flexion of the fingers and thumb on a linen compress in the hand. This contracture could not be overcome by any force safely applied to the fingers, but could be readily overcome by strong faradization to the extensors of the hand and fingers in the forearm. When last seen this case was under treatment by faradic and static electricity, and the occasional application of the magnet, but had not yielded, as before, to any treatment.



FIGS. 19 and 20.—Right hands of two patients of Professor Charcot's, with athetosis.

Athetosis is another condition which can be classed with contractures as a spasmodic deformity of the hand. Athetosis is not always a sequel to hemiplegia. It is confined to the extremities of one side, however, and appears gen-

erally after an apoplectic attack, a hemi- or general spasm, a severe headache, an aphasia, a vertigo, or some other manifestation of serious cerebral disturbance. Some weeks or months after such manifestations, which generally are hemiplegic, it is noticed by the patient that he is unable to keep his fingers or toes still, and that when left to themselves, and sometimes in spite of him, they are continually in motion. These movements are slow and vermicular, resemble in no particular any other spasm or any voluntary movement. They consist in alternate flexion and exaggerated extension, abduction and adduction of the fingers and thumb, all usually being meanwhile kept straight, the movement chiefly occurring at the metacarpo-phalangeal articulation. The more common attitude is extension and wide separation of the fingers and thumb. These movements are continuous, and only in a few cases can be entirely stopped by an effort of the will. The movements are aggravated by

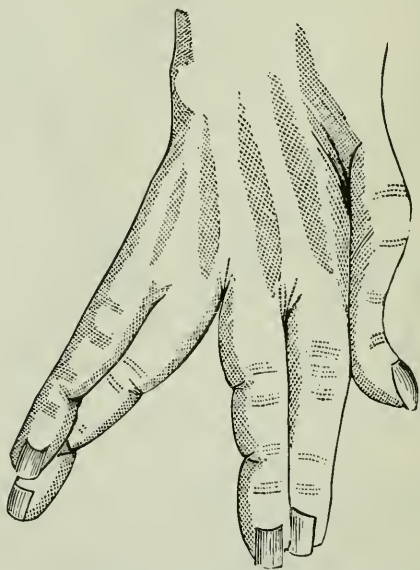


FIG. 21.—Right hand of a peculiar case of hemiplegia, followed by athetosis in the adult.
Service of Professor Charcot.

an attempt to use the part or the opposite hand, and are accompanied by a good deal of pain. There may or may not be impairment of sensibility in the part, generally none.

Continual exercise often causes an hypertrophy of the affected muscles, so that the arm and leg of the affected side are often larger than the opposite, and of great hardness. There is, however, a real loss of voluntary power in the part. In many cases there occur occasional epileptic paroxysms, and there is generally considerable failure of the mental powers. There are seen no trophic changes in the parts, and no change in the electrical reactions of the muscles.

The above remarks sufficiently cover the clinical aspects of the disease, so it will suffice to say that the patients from whom two of the accompanying sketches were taken were idiots about thirteen years old, affected with infantile hemiplegia and partial epilepsy, in the service of Prof. Charcot, at the Salpêtrière (see figs. 19 and 20).

A peculiar deformity of the hand occurs in the course of the disease known as *paralysis agitans*. This disease, rarely seen, except in adults past forty, begins by a slight rythmical tremor generally in the hand, or the fingers of one hand. This tremor gradually increases, becomes more general in the extremity first attacked, and then invades the other extremity on the same side, and perhaps later the corresponding extremity on the opposite side, and even toward the last, though rarely, all four extremities. The exciting cause of the disease appears in many cases to be a mental shock of some kind. The movement is generally continuous during waking hours and absent during sleep; is made worse by excitement of any kind, and is aggravated by a depressed mental or physical condition. In almost all cases it can be temporarily stopped by a strong effort of the will. The continual motion causes no such hypertrophy as *athetosis*, and

is very tiring to the patient, who often complains of severe pains in the muscles, which are the seat of tremor. The movement which is characteristic of the disease when fully developed is this: the arm is slightly abducted and the shoulder has a tendency to fall forward and inward on the chest, the forearm is flexed to nearly a right angle, thus bringing the hand in the neighborhood of the pubes, the most natural attitude for the patient. The hand is not generally flexed, but the fingers are semiflexed in a nearly straight condition, and the thumb is generally nearly opposed to them; the more common attitude then being that in which we hold a pen when writing. The fingers generally

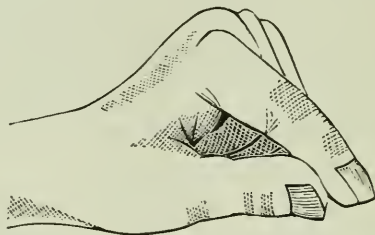


FIG. 22.—Left hand of a case of paralysis agitans under Professor Charcot's care.

have the deviation toward the ulnar border of the hand, as in chronic rheumatism. Such being the position of the hand, now for the movements.

Often there are slight flexions and extensions of the forearm and wrist. The fingers continually oscillate in movements of slight flexion and extension, which give the hand a pawing motion, and which, with opposition of the thumb, give the hand the appearance as if rolling a thread or paper ball between the fingers and thumb.

Later in the disease distortions like those in rheumatism may still further deform the hand, and atrophy may supervene from prolonged disease, and the electrical reactions may be modified, but in the uncomplicated disease they remain unchanged.

Late in the disease there comes on a marked rigidity of the spine, with flexion and projection forward of the head and neck, a fixed, stooping attitude, and a marked shortening of the stature. Slowness of speech and mental impairment often are present, and a symptom common to almost all is an unnatural subjective warmth of the body at night, or whenever they are in bed, leading them to require much less covering than other patients in the same ward, or than they themselves did before their sickness. The following is the history¹ of a typical case in which the tremor was very general:

The patient was a woman in the St. Alexandre ward of the Infirmary at the Salpêtrière under Prof. Charcot's care. She was 60 years old. Twelve years before she had a crying spell, brought on by some intense emotional disturbance. She noticed immediately afterward a weakness of the arms, first the right. Soon after the legs became weak, the right first. At the same time there were some cramps. Tremors appeared first in 1873.

The following notes were taken July 8, 1874:

The mouth is open about a centimetre; the lower lip falls. There is some difficulty in deglutition. Her sleep is often broken by pains in the fingers; she is always hot. The legs are adducted

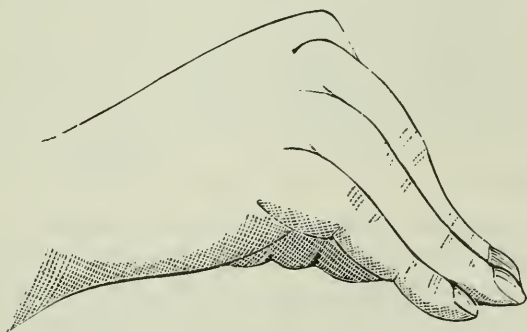


FIG. 23.—Right hand of a second case of paralysis agitans under Professor Charcot's care.

¹ Taken partly from the hospital records.

and the trunk strongly bent forward. The arms are slightly abducted and flexed, so as to bring the hands into the subumbilical region. The thumb is slightly flexed, and the index is semiflexed, and the other fingers are semiflexed together. The head is fixed and rigid.

At the time the sketch (fig. 22) was made, June 19, 1880, the condition of the patient was little changed. She had not walked for several years, and could not raise herself in bed. She is taken out of bed and sits doubled up in a chair. The head is inclined to the left shoulder and slightly forward, and is fixed. There is some tremor of the lower lip and tongue when protruded. Her arms are slightly abducted, the elbows are flexed, and both hands rest in the lap near the pubes, and are in continual motion, of the ordinary pawing variety. There is ulnar deviation of the fingers and a contracture of the hand, which can be overcome by force. There is considerable atrophy of the first interosseous muscle. There is considerable tremor of the left foot. The parts which are the seat of spasm are also painful, and not only is sensibility retained, but there appears to be some hyperæsthesia of the legs.

3.—PARALYTIC DEFORMITIES.

Under the head of paralytic deformities, of course, is included the temporary condition of the hand immediately after various nerve injuries. This is especially true of the deformity produced by injury to the musculo-spiral nerve. This deformity is simply a drop wrist, and this is to be spoken of immediately under lead paralysis, where all the points in differential diagnosis will be fully brought out.

A person after exposure to lead in various ways, by inhalation, by swallowing, and in all probability sometimes endermically, and commonly after some other toxic manifestations of the poison, as colics, constipation, cachexia, etc., rather suddenly notices an inability to extend the wrist and fingers, generally on both sides. Examination reveals the existence of drop wrist. There is partial or complete paralysis of the extensors of the hand and fingers.

Unlike the drop wrist from injury to the musculo-spiral nerve the supinator longus escapes in saturnine paralysis. The electrical reactions are, however, much the same, very soon showing the degeneration reaction to galvanism and a loss of farado-contractility.

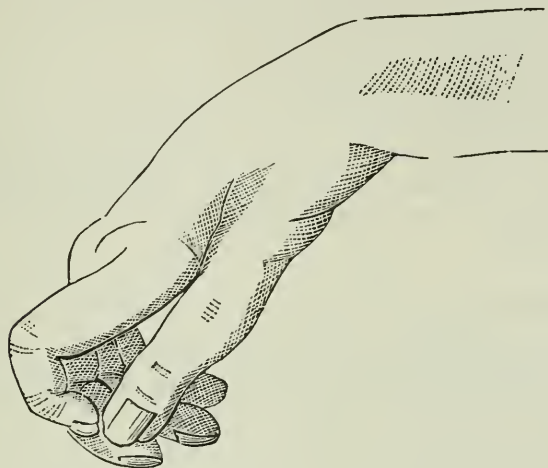


FIG. 24.—Right hand of case of plumbism, characterized by "drop wrist" and atrophy, under Dr. Seguin's care.

There is very apt to be a tumefaction on the back of the hand in these cases at first. If the paralysis remain long without treatment, atrophy may take place in the paralyzed area. There are no trophic changes, and there is generally only slight impairment of sensibility. As in the case here presented the paralysis is not always limited to the extensors.

Male, aged 42, first seen at the clinic of Dr. Seguin in the fall of 1878.¹ In July of that year, while he was occupied as cook on a freshly painted yacht, he woke up one morning with loss of power in both arms. He said he was in the habit of drinking water just from the tap every morning, and that this water was conducted through a lead pipe from the tank.

¹ Part of the history was taken from the records at the College of Physicians and Surgeons.

On Sept. 20th, when first examined, he had double drop wrist, some flattening of the thenar and hypothenar eminences, and preservation of the supinator longus. He had had no colic, and there was now no blue line on the gums.

Oct. 12th there was noticed for the first time a swelling on the back of the wrists.

Three years later he again came under observation. The drop wrist still persisted. There was much atrophy of the thenar eminences and of the first interosseous space. The grasp was good. Extension of the two last phalanges was possible in all fingers except the right index. There was some adduction but no opposition of the thumb possible. They were inverted and their distal phalanges were flexed. There was some impairment of sensibility in this case, and degeneration reaction in all the paralyzed and atrophic area.

A deformity of the hand which may supervene after an infantile hemiplegia, besides the permanent contracture already spoken of, is that which is called retarded development. This hand, which has little of the element of spasm or contracture about it, is essentially a paralytic deformity. The hand is simply smaller and less developed than its fellow. It is well nourished, mobile, properly shaped, has no atrophy, and generally no anæsthesia. It is very weak, and perhaps the occasional seat of associated or athetoid movements. Its electrical reactions are normal. Sometimes, as in the case furnishing the subject for the accompanying sketch, there is a slight tendency toward contracture, but it offers no resistance and the part is generally very limp.

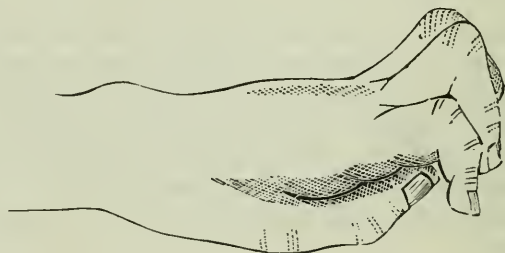


FIG. 25.—Left hand of K. B., patient of Dr. Seguin. Old hemiplegia and retarded development.

K. B.,¹ a girl of fourteen years, had a hemiplegic attack at the age of three. She never fully regained power on the left side, though at the time the sketch was made, June 8, 1881, the walk was hardly hemiplegic. The most noticeable feature in her case is the weakness and small size of her left upper extremity. The hand is perfectly shaped, and there is no atrophy, but it is very much smaller, as the following measurements will show :

	HEALTHY SIDE.	PARALYZED SIDE.
Circumference of the the wrist	16. cm.	12.5 cm.
Circumference of the hand below the first phalanx of the thumb	27.5 "	17. "
Circumference of the hand at the head of the metacarpal bones, excluding the thumb	19. "	15. "
Length of medius	10. "	8.5 "
Circumference of its first phalanx	5.75 "	5. "
Circumference of the thumb	6.25 "	5.25 "

At times, as for instance when this sketch was made, there is a slight tendency to contracture in the hand of this patient.

4. DEFORMITIES OF LOCAL CAUSATION.

An exhaustive description of hand deformities of local causation would hardly be in place in a journal devoted to neurology, however important they might be. Brief mention, therefore, of a few will be made, illustrated as well as may be by sketches. Arthritis deformans (the chronic progressive articular rheumatism of Charcot), as a disease by itself, is seen chiefly in people of adult life. It quite often begins in peripheral parts and tends in a centripetal direction. It is very slow in its progress, and its course is marked by very many intermissions. It often commences by a painful swelling of one or more finger or toe joints. The swelling is not accompanied by much heat, redness, and no subsequent desquamation, as in gout. The joints implicated are apt to be symmetrical, and the inflammatory process leaves them more or less ankylosed and distorted.

¹ Service of Dr. Seguin at the Manhattan Hospital.

Successive attacks recur in the same joints and implicate new ones, until a more or less complete ankylosis and marked deformity result. The disease, when advanced, implicates the larger joints of the body, even those of the spinal column, everywhere causing ankylosis and deformity. There are not always marked bony deposits about the

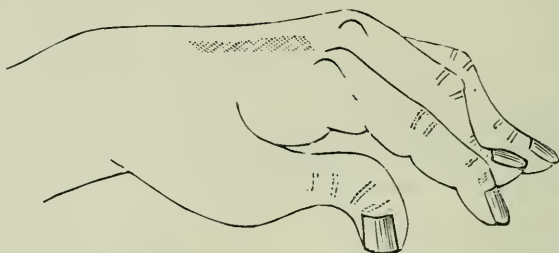


FIG. 26.—Left hand of a patient with arthritis deformans under Professor Charcot's care.

diseased joints and nerve deposits outside the joints, as in gout. In most all cases, as a result of combined muscular action and bony deposit in the joints, there is a deviation of the fingers toward the ulnar side of the hand. Beyond that there are no very typical deformities. There is often seen an extension of the first phalanges, a flexion of the second, and an extension of the third. (See fig. 26.) In others all the phalanges are more or less flexed. (See fig. 27.) The thumbs generally escape. The course of the disease is frequently marked by œdematous swellings of the hands.

From disuse and possibly from some spreading of the disease to the nerves or muscles very marked atrophy of

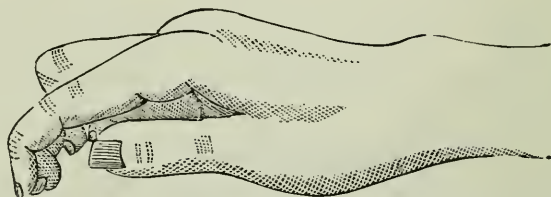


FIG. 27.—Right hand of a case of arthritis deformans under Dr. Seguin's care.

the intrinsic muscles of the hand ultimately ensues. Subluxation of the phalangeal joints sometimes occurs, and remarkable thinning and smoothness of the skin often ensue.

In rheumatic arthritis and sometimes accompanying acute articular rheumatism deformities of the hand are found, but they are not very typical. The disease is not always symmetrical; a single joint may be affected for years and a cure sometimes results. The inflamed joint is swollen, hot, and red, and very tender and painful. In almost all these particulars the disease differs from arthritis deformans.

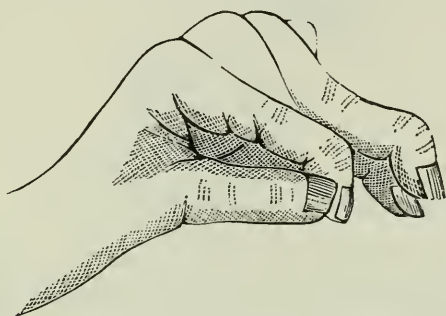


FIG. 28.—Left hand in cases of rheumatic arthritis under Prof. Charcot's care.

The deformity it leaves resembles that of arthritis deformans (see fig. 28) by presenting generally an ulnar deviation of the fingers and more or less osseous deposit about the joints. It differs again by often invading the thumb, which it leaves with extension of the last phalanx, giving it a curved appearance represented in fig. 29.

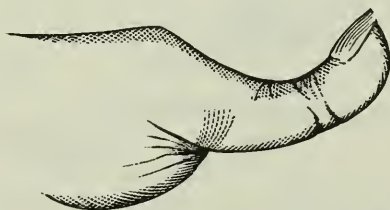


FIG. 29.—Left thumb in cases of rheumatic arthritis under Prof. Charcot's care.

The gouty might easily be mistaken for the rheumatic hand, particularly that form consisting simply of articular enlargements, anchylosis, and ulnar deviation of the fingers,

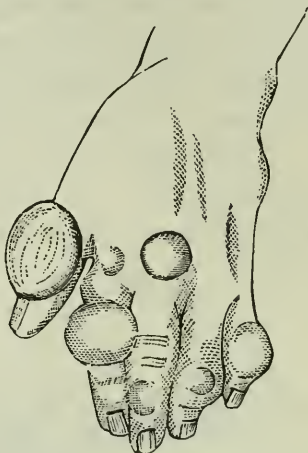


FIG. 30.—Gouty hand with tophi. Taken from Meillet.

were it not for the typical history the gouty case presents. When, however, the hand presents also the characteristic collections of urate of soda, or tophi, the deformity can be confounded with no other. These tophi present globular swellings, situated on various joints, varying in size from a

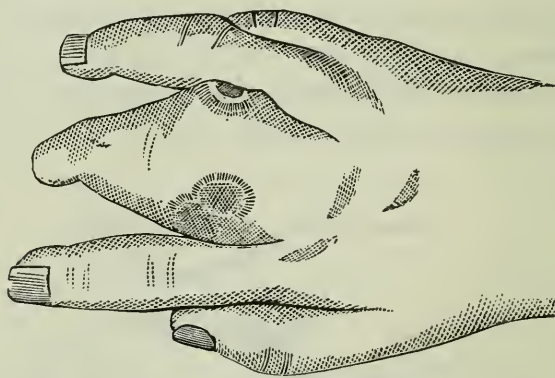


FIG. 31.—Hand with syphilitic dactylitis. Taken from Bumstead and Taylor's "Pathology and Treatment of Venereal Diseases." Phila., 1879.

pea to a pigeon's egg, covered by a thin bluish skin, often surrounded by tortuous, hardened veins. The indolent ulcers into which these concretions often break down would also be a mark of diagnostic value. (See fig. 30.)

The deformities produced by syphilitic dactylitis resemble in some features those of gout or rheumatism, but the clinical history, with the anatomical characteristics, will serve to distinguish them.

The deformity resulting from contraction of the palmar fascia cannot possibly be mistaken for any thing else, and all that is necessary is to introduce a cut copied from Meillet.



FIG. 35.—That of contraction of the palmar fascia, all taken from Meillet.

The bulbous finger tips and curved nails of cyanosis and phthisis need only figures borrowed also from Meillet.

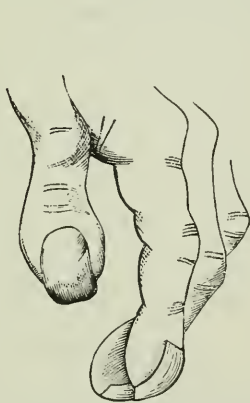


FIG. 33.—That of cyanosis.

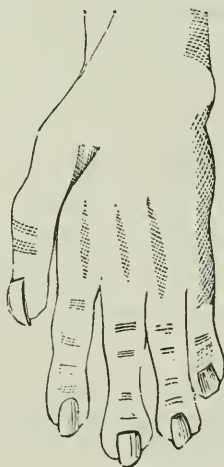


FIG. 34.—That of phthisis, and

The writer having seen but one case of scleroderma, and not having at command a sketch of her hands, borrows another illustration from Meillet, and regrets that space does not allow a brief *résumé* of that interesting disease.

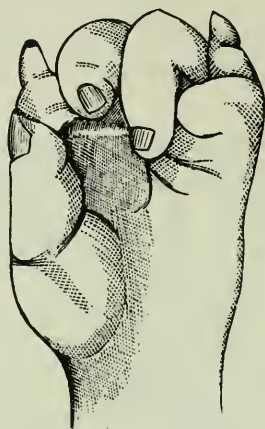


FIG. 32.—The hand of scleroderma.

At some future date a separate monograph may be made to treat more exhaustively of deformities of the hand of local causation, and perhaps those of a surgical nature, all of which are necessarily crowded out of an article like this, which treats simply of “medical” deformities.

DESTRUCTIVE LESION OF THE LEFT CEREBRAL
HEMISPHERE, WITH GENERAL PACHYME-
NIGITIS, AND A LARGE HEMORRHAGIC CYST
PRESSING UPON THE RIGHT HEMISPHERE, OF
THIRTEEN YEARS' STANDING.*

By H. D. SCHMIDT, M. D.,

PATHOLOGIST OF THE CHARITY HOSPITAL OF NEW ORLEANS.

THE following case of cerebral lesion is worthy of being recorded, not only for the extent of the lesions themselves, but also for the long period of time through which they existed. It illustrates the ability of the brain to bear a considerable amount of injury without causing a serious disturbance of the general health, or even of the mental faculties of the patient. As regards the history of the case, I regret to have failed in obtaining an official or otherwise more reliable account of the accompanying circumstances of the injury when first inflicted upon the patient than that furnished by the latter himself, as such a knowledge would have much facilitated the explanation of a certain phenomenon revealed by the autopsy. But as the patient was an inmate of the Charity Hospital for nearly fourteen years, he frequently told his story to the nurses and patients of the institution, and, from what I have learned, also without variation, which renders his account quite credible. The story runs as follows:

In the years 1865 and 1866, Edward Farley, of Irish na-

* The plates illustrating this article will be furnished with the next volume and mailed to subscribers.

tionality, worked at Memphis, Tenn., and was in the possession of some money, which he had lent to one of his friends. When asking one evening for the return of this money, his friend, who was performing the function of a watchman, answered the demand with a blow of his club upon Farley's head, felling him senseless to the ground. When recovering his consciousness, the latter found himself at the Memphis City Hospital, to which he had been taken, and where he had lived in an unconscious state for a number of weeks. He then found himself paralyzed on both sides, though at the time of leaving this hospital, to start for New Orleans, the left extremities had recovered their functions. Thus, when entering the Charity Hospital of this city, in 1877, he was only affected with right hemiplegia, which, however, did not prevent him from making his way to this institution a-foot. It is to be regretted that the physician of the particular ward to which he was assigned when entering the hospital is now dead for several years, as otherwise more accurate data concerning the patient's condition at that time might have been obtained. Through one of the older Sisters of Charity, who was then supervising this ward, however, I learned that the hemiplegia interfered but little with his movements, and that he had rather come to the hospital on account of his eyes, though in later years his sight appears to have been unaffected. In the course of some time, as it frequently happens with incurable cases, all special treatment was abandoned, and he became a permanent inmate of the institution, enjoying the privilege of roaming at his leisure about the place. As such I have met him about the hospital for a number of years until a few months before his death.

According to the statements of three old nurses, who knew him since 1869, and to what I observed myself, Farley was paralyzed in both extremities of the right side, with

contracture of the flexors of the forearm, wrist, and fingers. In walking he dragged the paralyzed lower extremity along, and as the large toe, in consequence of the paralysis of the flexors of the foot, frequently struck the ground, he sometimes stumbled and fell. His general health, including his appetite, was always good. He had no convulsions, no pains in the head, nor anywhere else. His mind was clear, and he was able to express his ideas at all times without difficulty, and intelligently refer back to things that had happened many years before. His disposition was very irritable, and a fit of anger appeared to render him somewhat stupid for a day. As I learned from one of the Sisters of Charity, he was very pious, and a regular visitor of the little chapel in the hospital, where, only during the last years of his life, he had some trouble in kneeling. A few months before his death he became more dull and peevish; he would roam about in a listless manner, and frequently be unable to find his way back to his ward; he would leave things behind him without being able to render an account of them, nor knowing where he had last been. During this time also he became unable to express his wishes or wants; he would apply to the nurse of the ward for one thing or the other, but, unable to tell what he wanted, he would come to a "halt," and mutter some incomprehensible words to himself; if, however, somebody would mention the thing he wanted, he would say "yes" in a startled manner; his sight also commenced to fail. About three weeks before his death his mind became completely clouded; he was unconscious of what he did, and on some occasions fell into a quiet swoon without convulsive movements. In such a condition he died.

Before dismissing the clinical history of this case, it remains to be mentioned that there was a deep depression of an oval shape, and soft to the touch, upon the left side of

Farley's head, corresponding to the place upon which the blow of the club had been applied. It was by this depression that the patient was known to most of the inmates of the hospital; though he himself always asserted that, to the extent of his knowledge, *there had never been an open sore or wound upon this place.*

The autopsy made in this case was limited to the examination of the head and brain. In the left parietal region of the former, the above-mentioned depression was noticed. There was no defect or cicatrix of the scalp observed over this area; the skin appeared healthy and was covered with hair as abundantly as upon the rest of the head; nor was there any difficulty in dissecting the scalp from the surface of the depression, it being attached to the subjacent structure by a soft connective tissue. When the cranium was exposed by the removal of the scalp, the depression was found to be due to a deficiency, or large hole, in the bony vault, filled and closed by a membrane of a dense structure, presenting a white, almost glistening, appearance. The orifice formed by the absence of bony tissue was perfectly oval in form, measuring $9\frac{1}{2}$ cm. in a horizontal, and 5 cm. in a vertical direction; the space between the superior border of the orifice and the median line of the vertex being about 3 cm. During the operation of removing the calvarium, it was found that the membrane filling up the orifice in the bone closely adhered to the dura mater, and, to accomplish the object in view, it became necessary to dissect the membrane from the bony margin without detaching it from the dura mater, after which proceeding the calvarium was removed without difficulty. In removing the dura mater, by cutting it at a level with the cranial bones left, another phenomenon was met with on the inner surface of the right half of this membrane, consisting in a large, so-called hemorrhagic cyst with comparatively thick

walls, indicating that it had existed for a long time. The upper border of this cyst ran parallel with the longitudinal fissure at a distance of 18 mm. The cyst itself measured in a downward direction $6\frac{1}{2}$ cm., while horizontally its length amounted to 10 cm.; it was ovoid in shape, and its thickness or transverse diameter amounted to 2 cm. As the result of the pressure of this cyst upon the underlying right cerebral hemisphere, the latter, instead of its normal convexity, presented a slightly concave surface, corresponding to the size and form of the cyst. As will be seen from the above description, the orifice in the bony vault on the left, and the cyst on the right side, were situated very nearly opposite to each other. The condition of the dura mater, and the structure of the cyst and the membrane, filling up the orifice in the bone, will be discussed further on.

The condition of the pia mater was that of chronic hyperæmia, the minute and larger vessels filled with blood; there was opacity of the arachnoid membrane almost over the whole convexity of the cerebrum; in some places even it was thickened.

In the left hemisphere of the cerebrum a large cavity was found, extending through the posterior third of the middle frontal convolution, directly in front of the sulcus præcentralis, through the two inferior thirds of the anterior and posterior central convolutions, the entire supramarginal and the anterior portion of the angular convolution, and, furthermore, through the superior third of the superior temporal convolution. The orifice of this cavity, that is, the area in which the cortex cerebri was entirely destroyed, embraced the root of the middle frontal, the middle of the anterior and posterior central, and the greater part of the supramarginal convolutions. The destruction was entirely confined to the white substance of the cerebrum, leaving

the gray substance of the cortex in the form of a shell with a perfectly smooth inner surface, and passing around the larger and smaller sulci in the depth of the hemisphere. The thickness of the wall left between this cavity and the upper part of the left lateral ventricle amounted to about 1 mm. The pia mater extending over the orifice of the cavity was not attached to the dura mater, but had fallen into the cavity, occupying about one third of the latter, and forming, so to say, a separate compartment of it.

Let us now consider the different lesions individually, commencing with the calvarium. The orifice in this bony vault was situated in the parietal and frontal bones, while its lower border slightly encroached upon the squamous portion of the temporal bone, its upper border being 37 mm. distant from the sagittal suture. The margin of this pathological fenestra in the bone was thinned, or bevelled, upon the outer surface, quite smooth, and presented the appearance of the outer table bent down by the disappearance of the diploë, while at the inside the border was even with the inner surface of the calvarium. In some places here the surface of the inner table appeared eroded, or roughened by the absorption of bony tissue. Directly in front of the coronal suture a small protuberance, or thickening of the bony margin, was observed. In the rest both the parietal and frontal bones appeared in a healthy condition.

The dura mater throughout, but particularly over and to some distance beyond the seat of the lesion, presented the appearance of inflammation, with all the characters of chronic pachymeningitis. Its inner surface was covered with a pseudo-membrane, upon the surface of which numerous minute red spots, resembling small extravasations of blood, were exhibited. On the right side the pseudo-membrane had developed into the cyst already mentioned. On the left side the dura mater was attached to, or rather con-

tinued into, the fibrous membrane, which, filling up the artificial foramen in the parietal and frontal bones, was closely attached to the bony margin and loosely to the scalp (fig. 1). A thin microscopical section of this part of the dura mater showed that the fibrous structure filling up the orifice differed in no respect from the former, adjacent to the arachnoid, but consisted of the same coarse bundles of connective tissue; nor were there any pathological changes observed in the newly formed portion. The fibrous structure, found in the place of the absent bony tissue, therefore, cannot be considered but a part, or thickening, of the dura mater. The inner or arachnoidal surface of the latter, on this side, was covered, as already mentioned, by the well-known pseudo-membrane.

Before proceeding to the description of the cyst, a few remarks regarding the particular pathological process concerned in the disappearance of the bony structure may be appropriate. My first idea as to the loss of bone in the cranial vault was that the bones might have been fractured by the weight of the blow into small fragments, and been subsequently removed by necrosis through an open wound,—a view which I, however, found incorrect when learning the patient's repeated assertions that there never had been a loss of continuity in the skin of this locality, and when, furthermore, no traces of a loss of tissue were detected at the autopsy. If the patient's statements were founded upon truth, then the disappearance of the bony tissue could only be explained by referring it to the effects of the blow having caused a disturbance in the nutrition of the bone, leading eventually to atrophy of the osseous tissue. There have been and perhaps always are a limited number of cases observed in which small portions of the cranial bones are found atrophied; but in these instances the absorption of the bone is caused by the pressure of tumors against the

inner table, or by deficient nutrition concomitant to old age or depending upon diseased arteries. In the case under discussion, also, the blood-vessels of that portion of bone injured by the blow may have been diseased and induced a process of atrophy, though it will still remain an open question as to whether the fibrous membrane filling up the orifice left represented the bone itself, *minus* the earthy constituents, or whether it arose from the inflamed dura mater to simply replace the atrophied bony tissue.

A vertical transverse section of the cyst on the right half of the dura mater (fig. 1) showed that this tumor was ellipsoidal in form, and contained two cavities greatly differing in size and separated by a thick partition formed by the inner strata of the cyst. While the vertical diameter of the upper cavity, or compartment, only measured from 11 to 12 mm., that of the lower amounted to 42 mm. The walls of this cyst were entirely formed by the successive layers of the pseudo-membrane, the dura mater itself forming no integral part of them. Their thickness measured in the average about 1 mm., which, in the upper half of the cyst, increased to nearly 2 mm. Thin, microscopical, transverse sections of the walls of the upper part of the cyst, including the partition or septum, showed that they consisted of numerous strata, or membranes, measuring in thickness from $\frac{8}{1000}$ to $\frac{10}{1000}$ mm., and which, microscopically, could be separated from each other with a little care. In the same manner a separation could be effected—rather more easily—of the layers composing the thinner portion of the pseudo-membrane covering the inner surface of the dura mater beyond the cyst, both on the right and left side.

Stretched throughout the cavities of the cyst, a net or framework similar in form to the stroma of a sarcoma or cancer, and consisting of coagulated fibrin, was met with; the larger or smaller areolar spaces into which the cavities

were divided by this network, and which communicated with each other, were filled up by a yellow, slightly reddish, gelatinous fluid. A microscopical examination of the anastomosing branches of this framework showed the characteristic structure of coagulated fibrin, viz., the minute network of fine granular fibrillæ.

Reserving some additional remarks upon the fibrinous framework extending throughout the cavities of the cyst for hereafter, I now pass to the description of the minute structure of the pseudo-membrane.

As may be supposed, and as has been known for some time, the mode of formation and development, as well as the structure of this membrane, whether forming the walls of a cyst, or whether simply covering the inner surface of the inflamed dura mater, presents everywhere the same peculiarities and characters. According to the prevailing theory, established by Virchow, the pseudo-membrane originally represents an efflorescence, or exudate, of the inflamed dura mater. The newly formed blood-vessels, extending through and forming a considerable portion of the neo-membrane, are regarded as derived from the adjacent dura mater, while the delicate connective tissue forming its substratum is supposed to originate from emigrated colorless blood corpuscles. Let us examine how far this theory corresponds with the results of my own examinations in reviewing the structure of a thin portion of the pseudo-membrane detached from the dura mater beyond the cyst. In doing so it will be observed that this membrane is very loosely attached to the dura mater, a circumstance which has been explained by the mutual connection between these membranes being solely affected through the minute blood-vessels passing from the latter to the former, as seen with the aid of a loupe, or even by the naked eye. This, however, is not altogether the case, for in examining thin sec-

tions, including the dura mater and pseudo-membrane, it will be found that the first stratum of the latter is generally closely attached to the former, and the separation actually takes place between this stratum and the next one. In these sections it will furthermore be observed that the individual strata or layers composing the membrane are not placed exactly parallel to each other throughout the whole membrane, but in many places run into each other by means of the network of blood-vessels, of which they are chiefly composed. And it is these blood-vessels, surrounded by bundles of delicate connective tissue, which are seen passing from the first to the second stratum when the membrane is carefully pulled off from the dura mater.

If one of the thin layers of which the membrane consists is separated from the rest, properly prepared, and examined under the microscope, it will be found that it is almost entirely composed of small blood-vessels, with a diameter ranging from $\frac{5}{1000}$ to $\frac{20}{1000}$ mm., and presenting themselves in very different conditions. Those among them approaching most closely the normal type show a single wall, distinguished by a distinct double contour, and lodge, the same as normal capillaries, a number of oval nuclei. These vessels, like all others forming the membrane, divide at short distances dichotomously or trichotomously, and, closely anastomosing with each other, form an intricate vascular network; they contain blood corpuscles in larger or smaller numbers. There are, however, a considerable number of other vessels exhibiting the same characters as just described, but presenting a second layer or coat formed around their original wall by a rather extraordinary process (figs. 2 and 3). Along the walls of these vessels, and surrounding them, namely, numerous larger or smaller masses of so-called hæmatin globules are observed. In the angles formed by the divisions of the vessels, particularly, entire accumulations of these

masses are met with. The masses themselves consist of a number of larger or smaller globules—the larger ones of the size of colored blood corpuscles,—and present the yellow color and lustrous appearance of crystalline hæmatin, or hæmatoidin; they are enclosed in a finely granular protoplasm, exhibiting a distinct border, and containing one or two nuclei, the whole mass thus bearing the general character of an organic cell. The largest of these bodies present, when round, a diameter of about $\frac{2.5}{1000}$ mm. A number of these masses, or hæmatin containing cells, especially when placed in the angles of the dividing vessels, appear round, while those placed alongside of the vessels present a more or less elongated form. From the protoplasm of the latter processes are observed to arise, which, blending with others proceeding from the protoplasm of neighboring masses, finally form a protoplasmatic layer around the vessel, which, itself, is eventually transformed into a delicate neoplastic connective tissue. The general tendency of these masses of protoplasm and hæmatin globules, therefore, is toward organization.

A larger or smaller number of colored blood corpuscles are observed in the interior of the blood-vessels, though many of the latter, especially those of small diameter, are found empty. These blood-corpuscles, however, do not appear with smooth surfaces, as ordinary normal colored corpuscles present, but, like nuclei, show a distinct double contour, and contain from four to six distinct granules. It might be supposed that this appearance was due to these corpuscles having assumed the mulberry-form; but from my close and careful examinations I feel satisfied that this is not the case, though I am unable to explain the phenomenon. A number of years ago, I had met with nuclei resembling colored blood corpuscles in the newly formed minute blood-vessels of the chorion of a very small hu-

man embryo, from which observation I am inclined to regard the above blood corpuscles, also, as newly formed.

From the observation made on the blood-vessels above described, the whole process concerned in the formation of the new layer around their original walls may be presumed to commence with an escape of blood corpuscles, either by capillary hemorrhage, or even by diapedesis, from the interior of the delicate vessels. The same may be said of numerous other colored blood corpuscles not collected in masses, but irregularly lying in the meshes of the vascular network; though it appears to me that these may rather have escaped from the vessels by capillary hemorrhage. At any rate, the morphological elements of the blood, the colorless, as well as the colored corpuscles, escape from the vessels by one or the other mode, and give rise to the formation of those well-known cells containing a larger or smaller number of colored blood corpuscles. For a number of years now these cells have been frequently observed in hemorrhagic effusions, and their formation was at one time attributed to the gluing together of a number of colored corpuscles by coagulated fibrin; but in more recent times, since it was discovered that the protoplasm of the colorless blood corpuscles has a tendency to embrace foreign bodies, such as the granules of insoluble coloring matter, etc., it became obvious that these compound cells, in reality, represented colorless blood cells which had swallowed their colored brethren. I have become convinced of this fact on different occasions, but particularly about thirteen months ago, when examining some serous fluid drawn by tapping from a cyst situated in the recto-uterine pouch, very probably ovarian in nature. This fluid contained a limited amount of blood, with an apparent excess of colorless blood corpuscles; they mostly represented the larger kind, and many of them had assumed still greater dimensions by

their protoplasm having embraced a number, in some instances as many as a dozen of colored blood corpuscles. In this instance there remained no doubt that these cellular forms represented, in reality, colorless blood corpuscles, the nuclei of which could be distinctly observed between the colored corpuscles enclosed by the protoplasm; the minute granules of the latter also were still in motion.

As soon as the blood, therefore, has escaped from the vessels of the pseudo-membrane, the colorless blood corpuscles seize upon as many of the colored ones as their protoplasm is able to hold, and, with their prey enclosed, arrange themselves around the walls of the blood-vessels for the purpose of forming an additional layer around them from the building material they previously swallowed in the form of colored blood corpuscles. As the formation of the layer proceeds, the colored corpuscles contained within the protoplasm are diminishing in size, until nothing is left of them but a few small hæmatin granules, which finally also disappear. The regular arrangement of the hæmatin cells around the walls of these vessels seems to indicate that here the escape of the corpuscles probably takes place by the process of diapedesis.

The above-described mode in which the formation of an additional coat around a newly formed blood-vessel is accomplished in the pseudo-membrane of the dura mater, is very interesting, and, from all I know, appears to have been observed only in this membrane, though it may be presumed that it also takes place in other localities where capillary hemorrhages occur. But, besides this, there is another phenomenon observed, consisting in a number of spindle-shaped cells, which not only adhere to each other by the poles of their spindles, but, moreover, appear connected with certain processes arising from such hæmatin cells as do not lie in the immediate vicinity of blood-vessels,

and from which it may be presumed that these cells are also capable of forming the latter themselves (fig. 4).

But, interesting as it may be to behold the wonderful and original ways and means to which Nature resorts to accomplish a certain object, in this case, at least, her efforts appear to be fruitless; for scarcely has she succeeded in strengthening the vessel, when its further development is arrested, and a retrogressive process commences, by which it is transformed into a connective tissue, forming a part of the membrane. It is thus that in the strata of the pseudo-membrane we meet with vessels which, like those above described, exhibit in many places a second layer, or coat, and a number of nuclei still embedded in their walls, but without a single hæmatin cell to be seen along the latter (fig. 5, *a*). That these cells, or compound blood corpuscles, containing the material for the construction of the additional coat, have likewise once existed here, is proved by the presence of the latter around the vessel. But the material which they had accumulated was insufficient for the work to be accomplished, and the laborers, after sacrificing their own substance, left their work unfinished, to be transformed into an inferior structure.

The next step in the retrogressive process of these vessels, therefore, is the disappearance of the nuclei, and the fusion or melting of the walls into a finely fibrillar connective tissue. The different stages of the whole process may be distinctly traced from one vessel through its anastomosing branches to others (fig. 5, *c* and *b*), and the gradual transformation of the vessels be distinguished by the more or less defined outlines, or paler appearance, which they exhibit.

These transformed vessels, however, do not form the only basis of the pseudo-membrane, for throughout their meshes another extremely delicate connective tissue, consisting of

very fine, pale, but granular fibrillæ, is observed to extend. The origin of this tissue is quite obscure, though the idea has been advanced that it owed its origin to a secretion of the spindle-shaped nuclei, or emigrated colorless blood corpuscles which it contained. It is true that there are many hæmatin cells, which took no part in the formation of the additional layer around the blood-vessels, or in the original formation of the latter, left distributed throughout the strata of the membrane, which seem to gradually melt away, as indicated by the hæmatin globules appearing now in the form of very small granules, or by the faint outlines and general appearance of their protoplasm (fig. 6). The number of these cells, however, appears too small to account for the quantity of the connective element. I am, therefore, inclined to think, that while they may be instrumental in the process of formation of the latter, an additional amount of formative material is furnished by the blood-vessels in the form of an exudate. This exudate appears at first finely granular, its organization taking place by the minute granules arranging themselves into rows, in order to become finally fused into fibrils, of which the granular, or, at least, finely knotted appearance can be distinctly seen under the microscope. The same mode of development of the fibrillar connective tissue I have observed, a number of years ago in the pia mater of the spinal marrow of very small human embryos, and in other instances afterward. But independent of this mode of formation of the delicate connective element, the latter is also derived from the connective tissue of the transformed blood-vessels above described, the bundles of which, after gradually becoming much thinner and broader, eventually fuse with each other to a certain extent, and assume a more homogeneous appearance. This process, I may safely assert to take place, as I have distinctly observed a connection existing in this

manner between the connective tissue representing the substratum of the membrane and the transformed blood-vessels.

Let us now return to the cyst, which, in its formation and development, also offers some points of interest. There were in reality, as already stated, two distinct cysts or cavities forming the hemorrhagic tumor, the origin of which may be traced back to hemorrhages, occurring, not from the vessels of the dura mater, but from those newly formed vessels of the pseudo-membrane, and into or between the strata of the latter. It will be observed (fig. 1) that the upper and smaller cavity is triangular in shape, while the larger and inferior one presents an oval form. From this, it may be presumed that the smaller cavity, which I suppose to have been formed before the other, could not have presented this triangular form directly after the effusion of blood took place into the layers of the membrane, but was, very probably, at first ellipsoidal in its outlines. But, when a second, and more considerable effusion of blood, causing a much larger cavity, subsequently occurred, the partition, or septum, left between the two cavities, was, by the gradual extent in the dimensions of the latter, stretched and pressed upward, rendering thus the upper cavity more triangular. At the same time the superposition of new pseudo-membrane strata, which, before the formation of the cavities, had only proceeded from the direction of the dura mater, now, very probably, chiefly proceeded from the internal surfaces of the cavities, and thus the septum between the latter gradually assumed the shape in which we behold it, though new strata may likewise have been formed upon the outer surface of the inner wall of the tumor.

In connection with the new strata upon the cavernous surface of the pseudo-membrane, it may be asked, how far the fibrin of the effused blood took part in the formation of

these layers. The question whether coagulated fibrin is capable of becoming organized into connective tissue has always been an interesting one to me, though I never formed a definite opinion regarding this subject when examining old fibrinous exudates. For this reason I examined very closely the fibrinous framework already described as extending throughout the cavities. The result was that, while the greater part of it exhibited the general character of coagulated fibrin, there were, nevertheless, a considerable number of bundles observed, in which the meshes of the fibrinous network had much increased in size, and its fibrillæ assumed the appearance of crossing each other, like those of connective tissue. In other parts of the framework, especially in those adjacent to the wall of the cavity, bundles of fine, straight fibrillæ, running parallel to each other, were even observed. In the sections of the walls of the cavities it was observed that in many places the fibrin passed gradually into the innermost layer of the walls without any distinct, defined border. This observation has inclined me to the view that, under certain conditions, coagulated fibrin, when in close and intimate contact with living structure, may be transformed into connective tissue ; or, as in the case before us, furnish, at least, the material for the formation of such tissue under the influence of the wandering cells. In the fibrinous framework itself numerous colored blood corpuscles and a few colorless ones, but no hæmatin cells, were observed.

Before closing the discussion of the hemorrhagic cyst of the dura mater, it remains to be mentioned that in the sections a number of hæmatin cells were observed between the dura mater and the first layer of the pseudo-membrane, from which fact the deduction may be made that, while the first neoplastic stratum represents an exudate from the inflamed vessels of the dura mater, capillary hemorrhages do,

at the same time, occur between the two membranes, giving rise to the formation and development of hæmatin cells, through the activity of which the new blood-vessels and other elements of the pseudo-membrane are called into existence.

As regards the cavity in the left hemisphere of the cerebrum, it has already been mentioned that the destructive process had been limited to the white substance, the gray matter of the cortex cerebri, with the exception of that portion lost by the formation of the orifice, being left in the form of a shell. The microscopical examination of a thin section of the entire walls of the cavity showed that the destruction had been exactly limited to the fibres of the corona radiata, but that the entire cortex, and the commissural fibres connecting the neighboring convolutions, had been left. But, while in the anatomical elements of the cortex, with the exception of vacuoles around the ganglion-cells, no pathological changes were observed, the commissural nerve fibres had undergone a degenerative process. This process appeared to consist in an atrophy, or gradual wasting of the medullary sheath and also the axis cylinder, a breaking up into small granules or anatomical molecules. In some places the nerve fibres had entirely disappeared, and nothing was left but the naked neuroglia, of which here I was able to thoroughly convince myself that it does not represent a continuous network, but consists, as I have elsewhere stated, of fine and straight fibrillæ crossing each other obliquely. In other places the nerve fibres were still represented by mere shadows without definite outlines, though colored by carmine, a phenomenon which may be explained in presuming that, while the medullary sheath and the axis cylinder had undergone this granular degeneration, the tubular sheath of Schwann was left to absorb the carmine. In some places, however, a few varicose

fibres with double contour, or single axis cylinders, were also observed. The numerous nuclei, lodged between the fibres, were all left, and colored by hæmatoxylin. In some parts of the walls of the cavity extravasated colored blood corpuscles and hæmatin globules were met with, but no trace of organization could be discovered. As already stated, the internal surface of the cavity presented, microscopically, a perfectly smooth appearance, resembling a living pseudo-membrane. Upon a section of the walls, also, the portion bordering the cavity presented a denser appearance, as if some organization had here been attempted. But, when examined microscopically, it was found that, though the structure of this border appeared denser than the rest of the wall, the appearance depended on no special organization, but was merely caused by an additional number of round and also spindle-shaped nuclei, which, nevertheless, might indicate that a fuller attempt had been made by nature to limit the progress of the disease.

The chief interest, which the above-described case of destructive lesions of the cerebrum offers, consists in the extent of the lesions and the length of time during which they existed without much disturbing the general health, or even the mental faculties of the patient. Some other interesting points, relating to the physiological psychology of the case might, besides, be discussed, if the extent of our knowledge of the true mechanism of the cerebrum and its cortex was not so limited. I shall, therefore, postpone this part of the subject until the time will have arrived when I may turn to this case for the purpose of illustrating some special views.

Explanation of the Illustrations.

Fig. 1.—Represents the anterior view of a section of the calvarium, with dura mater and pseudo-membrane. Upon the inner surface of the right half of the dura mater, the hemorrhagic cyst with its two cavities, and the fibrinous network extending through the latter, is seen; on the left side, the orifice in the calvarium, filled up by the fibrous structure arising from the dura mater, is observed; *a*, calvarium; *b*, dura mater; *c*, pseudo-membrane; *d*, fibrous membrane, filling up the artificial foramen in the bone (natural size).

Fig. 2.—Represents a small blood-vessel of the pseudo-membrane, showing the additional layer, formed by the hæmatin cells around its walls (375 diameters).

Fig. 3.—Represents a blood-vessel of the same kind, but of a larger diameter, and with larger hæmatin globules lying along its walls (375 diameters).

Fig. 4.—Free hæmatin cells, distributed throughout the meshes of the vascular network of the pseudo-membrane. Some of them are sending out processes, which, as it appears, form a connection with certain long spindle-shaped cells, resulting, probably, in the development of blood-vessels (375 diameters).

Fig. 5.—Represents the network of retrograding blood-vessels of the pseudo-membrane; *a*, blood-vessels during the first stage of the retrogressive process, still exhibiting the additional neoplastic coat, and also a number of nuclei; *b*, blood-vessels already transformed into connective tissue, the nuclei have disappeared; *c*, vessel, showing the connection with the latter, and the gradual transformation; *d*, delicate connective tissue of the substratum of the membrane (375 diameters).

Fig. 6.—Minute hæmatin granules, representing the remains of hæmatin globules in the substratum of the membrane (375 diameters).

CILIO-SPINAL CENTRES.

BY ISAAC OTT, M.D.

THE existence of cilio-spinal centres has been lately the subject of discussion. Budge's discoveries were first called in question by Salkowski, who believed that cilio-spinal centres did not exist, but that cilio-spinal fibres arose in the medulla oblongata or higher. François-Frank has, however, after the method of Budge shown that spinal centres influencing the movements of the iris exist. Luchsinger by means of sensory irritations has shown that cilio-spinal centres exist. Tuwim, however, has thrown doubt on these experiments of Luchsinger, stating that after section of the spinal cord sensory irritations did not dilate the pupil. I have made a number of experiments upon this subject. Method: Cats were chloroformed, bound down, the cord divided just below the medulla oblongata, and artificial respiration kept up by a respiration apparatus already described. After a rest of some time the sciatic was irritated by induction currents of a Du Bois apparatus, which was run by a Daniell cell. The external palpebral commissure was slit up, and the nictitating membrane and lower lid held away by weighted hooks. If now the sciatic was irritated the pupil was seen to dilate about two millimetres. When the cord centres were excited by another irritant acting on them through the blood, carbonic acid, then the pupil was also dilated. The cilio-spinal centres

may be demonstrated to exist, I think, in another manner. If in a cat the left cervical sympathetic is cut and the cord divided high up, then if no spinal centres acting on the iris existed, the diameters of the pupils should be equal, but experiment proves that the pupil with the sympathetic intact is more dilated than the other. Here some influence through the cervical sympathetic from the cord is acting. It might be objected that the tonic influence of the stellate ganglion, or fibres, still coming from the medulla oblongata caused the right pupil to be larger, but the left pupil was still under the influence of the superior cervical ganglion. I think that it is fair to draw the conclusion that the right pupil is kept larger by the influence of the cilio-spinal centres. I have also made experiments to determine the path of dilating fibres of the pupil by sensory irritation. When in a cat I had cut both cervical sympathetics, and the sciatic was irritated, the pupil was dilated. When the first thoracic and superior cervical sympathetic ganglia were extirpated and the sciatic irritated, the pupil still dilated. When the gray matter on the surface of one of the cerebral hemispheres had been broken up and the cervical sympathetic cut, then irritation of the sciatic dilated the pupil. When the gray matter of both cerebral hemispheres was broken up and both sympathetics in the neck divided, sensory irritation still dilated the pupil. When, however, the cerebrum was broken up down to the base of the brain and the cervical sympathetics cut, the sciatic irritation was powerless. These experiments lead to the conclusion that fibres dilating the iris run in the trigeminus, and that the seat of the dilation is here, and not in the seat of consciousness, as held by Schiff. The sympathetic ganglia also have an influence on the diameter of the pupil. François-Frank and Tuwim have made experiments upon this point. I have also exsected these ganglia. When in a cat the right first

thoracic ganglion is cut away from all spinal connection and the trunk of the sympathetic below it cut and the opposite sympathetic divided in the neck, then the right pupil will be found to be larger than the left. If now a section in the same animal experimented upon be made above the first thoracic ganglion, the diameter of the pupils will be the same. If the superio-cervical ganglion on the right side is extirpated, then the right pupil is smaller than the left. If in young cats the right superior cervical ganglion is extirpated and the left sympathetic below the ganglion divided, then when the animal is coming out of the chloroform the left pupil is at the time larger than the right, but shortly afterward it is smaller than the right, and remains so for several days. If atropia is given it does not change the result. These experiments demonstrate, that in the ganglia of the sympathetic resides a tonic influence for a short period over the pupil after they have no anatomical connection with the cilio-spinal centres in the spinal cord. I have already shown by experiments upon rabbits that after section of a lateral column the pupil on that side contracted, showing that cilio-spinal fibres run in these columns and that section removes part of the spinal influence on the pupil.

SPINAL IRRITATION.*

By J. S. JEWELL, M.D.

IT is no part of my intention in this brief paper to enter upon a history of the literature of this disorder, beginning, as it does, in various more or less vague descriptions in the works of older writers, and from them advancing down to the present rather abundant, but seldom practically valuable literature.

My intent is rather to give the results of a rather prolonged experience with and study of this disorder.

Several classes of affections have been confounded together in descriptions of spinal irritation.

In the first place, various diseases of the vertebral column itself, such as spondylitis, more especially its subacute and chronic non-suppurative forms, with or without enlargement or deformity. Then, again, it would appear, in some instances, to have included disease of the muscles themselves, or of the abundant ligamentous tissue of the spinal column, such as myalgias, rheumatic irritation of the external fibrous and muscular structures of the spinal column, chronic syphilitic affections, attended with pain and soreness, affecting the periosteum of the vertebræ, and chronic affections of the dura, more particularly subacute congestions and inflammatory affections of this membrane, attended with local

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pain and tenderness ; also recent subacute affections of the sensitive tract of the spinal cord. These disorders, not to mention those of so-called hysterical origin, have either one or all been by various writers included under the term spinal irritation.

Setting these various classes of affections to one side, and directing attention to the spinal cord itself, we find wide diversities in opinion as regards the nature or pathology of the disorder in question.

It has been considered as due to congestion, or, on the other hand, as due to anæmia even of limited tracts of the cord, such as its posterior columns ; or in other cases no positive opinions have been emitted as to the nature of the affection, the task of working out a pathology having been resigned as impracticable in the present condition of our knowledge.

It will be impossible, in the time and space to which I have limited myself in this paper, to discuss all these questions. I shall, therefore, as already intimated, content myself with a statement of the views I have finally adopted as to the nature and treatment of spinal irritation. I will begin, therefore, by citing its more prominent characteristics. Thus, in the first place, pure spinal irritation includes exaltation of the pain-sense, in the nerves which enter the horizons of the spinal cord, which are the real seats of the affection. As a rule, except for short periods in time, there are no paræsthesias, such as numbness, tingling, prickling, and other similar morbid subjective sensations, in the sphere of distribution of the nerves in question. As a rule, marked anæsthesia of the tact-sense is not present. But there is a true hyperalgesia, or exaltation of the pain-sense, which is the more marked as the sensitive nerve trunks involved are shorter. In other words, the nerve twigs which supply the skin over the spinal column itself are known, of course, to

be shorter than those which proceed from the front of the body or from the limbs. The longer the nerve trunk the less irritable it seems to be; the shorter its course is before it terminates in the gray matter of the spinal cord the more irritable it seems to be. Hence, the chief external seat of morbid nerve sensibility is, as might have been expected (in view of the apparent fact just stated), greatest over the spinal column itself.

In the second place, the augmentation of pain sensibility, which belongs to spinal irritation, is more marked, as a rule, in response to a slight touch than to a heavier touch, especially if the latter is made gradually. The morbid sensibility, therefore, which belongs to spinal irritation is not of the same nature as that which belongs to the inflammatory soreness, which, as a rule, is more painful as the pressure is more firm or forcible.

Then, again, in spinal irritation there is no regular increase of temperature, or disturbance of the circulation, or swelling either in or beneath the skin of the morbidly sensitive region, that can be determined by the most careful examination. Then, true spinal irritation can seldom be traced, with certainty, to physical injury of the spinal column. Then, again, reflex excitability of the affected zones of the cord is seldom diminished, but much more frequently than otherwise increased.

Spinal irritation seldom or never includes paralysis either of sensibility or motion, in uncomplicated cases, either in the parts which receive their nerves from the affected zones of the cord, or from parts which are below or behind them.

Spinal irritation seldom ever affects in any given case the entire length of the spinal cord, but, as a rule, only certain horizons or zones of the same, especially the lumbar, brachial, and cervical zones. It usually occurs in persons having a

nervous temperament and presenting more or less marked symptoms of nerve exhaustion.

The pain of spinal irritation, though frequently spontaneous, is nearly always a *fatigue* pain, or one which the patient describes as being a "tired pain," which is relieved, in a measure, by rest in an easy posture, made worse by exercise, and though aggravated by movements or motions, is not to the same extent so as in cases of disease of the spinal column or of the dura.

These latter disorders are, as a rule, clearly localized and present a variety of symptoms, some of which, more or less, agree with those of spinal irritation, but others offer a wide difference, sufficient to enable the careful observer to distinguish between them, or, at least, to enable him to determine the presence, in complicated cases, not only of true spinal irritation, but of the other disorders with which it is so often confounded.

Without undertaking at present to state all the reasons in view of which I have arrived at my conclusions as to the intimate nature of spinal irritation, I will state them briefly. In every case of true spinal irritation the chief seat of disease is in the spinal cord, in its sensitive tract. It includes, first of all, a nutritive lesion in which, to use a favorite phrase of mine, there is a more or less marked loss of balance between waste and repair, the former having outrun the latter. In my view of the case there is positive leanness, or substantial interstitial loss of the ultimate nerve elements. It is believed that, as in the case of the wasted muscle, or like leanness or loss of volume and weight in any given part, or even of the whole body, accompanied by a corresponding loss of energy or power, the same condition occurs in the exceedingly active and frequently overworked nerve mechanisms, especially those of the spinal cord. It is true these things have not been made

the subjects of ocular demonstration, but the course of reasoning is so direct and cogent, based upon well-known facts ascertained by observation in relation to more accessible parts of the body, as to compel the acknowledgment of the position taken as substantially correct. Any part of the spinal cord which is habitually over-excited or over-worked, and the consequent wear of which has gone on faster than the reparative work of nutrition for the same part, sooner or later may suffer not only a loss in volume and in power, but the process of wear and tear, when it has advanced to an extreme degree, even in a muscle, gives rise to irritation, the expression of which is at first a mere feeling of fatigue, but if the process of wear is carried farther, fatigue graduates into pain.

If repair of the nerve waste out of which these symptoms arise is accomplished by rest and nourishment, not only the pain but the fatigue disappear. But if the degree of waste is great, and if the circumstances of the case are such as to retard or prevent the process of repair from being carried forward, so that the part in question remains, as regards its nutrition, constantly in that state which gives rise to fatigue and pain, then these latter symptoms, like the lesion of nutrition, of which they are the common signs, become permanent, more especially if the seat of lesion is in the æsthesodic or sensitive tract of the central nervous system.

In spinal irritation, therefore, the first thing to be recognized is the lesion of nutrition just described, in which there is a more or less permanent and marked preponderance of waste over repair, the process of destruction or waste having been carried to such a degree as to threaten the integrity of the parts, the inarticulate protest against the farther progress of wear being the constant fatigue pain which marks uncomplicated cases of spinal irritation.

With this view, so far as I am aware, do all the phenomena of spinal irritation agree. Rest, the moderate, judicious use of anodynes, tonics, good feeding, include the methods most approved by experience. Nothing is better known than that persons affected with spinal irritation are often in a chronic manner fatigued, in some instances bed-ridden. Nothing is better known about such cases than that exercise, unless of the most moderate character, aggravates the spinal pain and exhaustion.

Having got firmly in view the nature and the immediate relations of the lesion of nutrition just described, I would next call attention to the circulatory disorders which, it seems probable, follow in the wake and occur in the place of the lesion of nutrition described. For my own part, I am clearly of the opinion that within the areas of exhaustion and irritation in the spinal cord there is a fluctuating blood circulation. It may be normal, or there may be a congestion, or there may be anæmia. But this latter condition I conceive to be a rare occurrence and by no means a necessary factor in spinal irritation. Spinal irritation is, therefore, not due to either congestion or anæmia, whether in the posterior columns or other parts of the cord. But I can readily understand that departures from the normal state of blood circulation in the disordered areas are generally toward congestion. Both congestion and anæmia are mere incidents in the course of the disorder under discussion. The fundamental factor is the lesion of nutrition already described. It is important to admit this, not only because it agrees with all the facts, but once fully understood, it points imperatively to the path of recovery, which happily harmonizes in every particular with the results of experience.

Having said thus much concerning the symptoms and nature of spinal irritation, I would next direct attention to

its chief clinical varieties. If what has been said is true of the nature and pathology of the disorder, we may, *a priori*, designate certain altitudes of the cord which would be more likely than others to be the seats of the disease. I would point out two great classes of cases: First, those due to *over-action*, chiefly muscular in character. Second, those cases due to *over-excitation*, or in which the spinal cord is not disturbed on account of its share in the production of muscular activity, but rather on account of the excitations that play into it from different regions to be later specified.

I. Then, first of all, those cases which depend upon *over-action*. The altitudes of the cord most likely to be affected in this way are the lumbar; that is, the altitude corresponding to the lower members, or to the levels of central implantation of the sacral and lumbar plexuses of nerves. Second, the brachial zone of the cord, which corresponds to the upper members in the same manner as does the lumbar to the lower members; and, finally, the sub-occipital zone, including the muscles by which more particularly the upper part of the cervical region of the spine is maintained erect and the head balanced upon the spinal column. I am not able of course to speak for others, but in my own experience I have found a large number of cases of spinal irritation to be due to over-use of the legs in standing, walking, and in other occupations in which they are strenuously or persistently used for long periods in time; or at other times due to over-use of the arms, as in sewing, embroidery, painting, piano practice, and in hundreds of other occupations, in which the upper members are habitually over-used; or, finally, the same condition is seen in cases, where the head is bent forward so as to put the muscles of the neck in a state of all but unremitting tension. The conditions of action described imply, of course, a constant tide of innervation to the related muscles, and this again

implies continuous fatiguing activity on the part of the spinal cord ; and at last the decisive irritation of extreme denutrition of those tracts of the cord which are entered by the motor and sensitive nerves of the muscles can hardly be mistaken, when I say that these three great zones of the cord are brought with exceeding frequency, into that worn, fatigued, painful state which is called spinal irritation. How over-use of the cord, especially in persons of nervous and feeble constitution, in whose cases nutrition or reparative power is not vigorous, may produce the lesion of nutrition already described, does not seem to me difficult to understand.

II. I would next call attention to that exceedingly important and, thus far, not very well-defined group of cases which depend upon *over-excitation*. The horizons of the cord which may be the seats of irritation in this group of cases are almost unlimited. In this paper it will be practically impossible to describe all the particular forms met with in clinical experience. I may, however, call attention first of all to two principal levels of the cord which are frequently the seats of "spinal irritation." They are the pelvic and gastric zones of the cord. In this class of cases the supposition is, that some peripheral organ is the seat of irritative disease. It is supposed that the sensory nerves which ramify in the diseased organ are, like its other structures, involved. It is farther supposed that, so long as the irritative disease exists in the organ, a more or less continuous tide of irritative "influence" is directed by way of its nerves into the corresponding altitudes of the spinal cord.

Night and day, whether asleep or awake, an irritative influence enters the cord and contributes to the exhaustion and irritation of its related mechanisms. In this way it comes to pass that inflammatory or other irritative dis-

eases, let us suppose, of the uterus, its fundus or its neck, or disease of the ovaries, or of the rectum, or bladder, or, in the male, its prostatic zone or the urethra, lead sooner or later, if persistent, to exhaustion and irritation of corresponding horizons of the cord. Hence the all but uniform tenderness, exhaustion, pain, etc., in the lumbar and sacral regions of the spine in cases of irritative disease of the pelvic viscera. Then, again, no part of the alimentary tract is so often the seat of important irritative disease as that which lies in what may be called the gastric zone. This includes the stomach, more especially its mucous membrane, the liver, and the duodenum. Irritative disease, especially chronic subacute affections of these organs, involve their nerves, and these become the channels of a disturbing influence, which sooner or later exhausts and irritates the corresponding horizons of the spinal marrow. These horizons for the stomach, etc., lie between the third and the eighth dorsal vertebræ, or in the interscapular region. Spinal irritation situated within these limits, I have found, points, with almost unerring certainty, to irritative disease in the gastric zone.

The spinal horizons which appear, clinically speaking, to stand in connection with the small intestine, are included between the eighth and eleventh dorsal vertebræ. The horizon which, in like manner, I have found to correspond to the colon, especially its descending portion and its sigmoid flexure, lies between the eleventh dorsal and the second or third lumbar vertebræ, whereas the spinal region, tenderness of which appears to stand in connection with disease within the pelvic zone, extends from the lower dorsal down to the limits of the lumbar part of the spine or even beyond, while disease of the rectum, especially about the anus, and of the neck of the womb, finds its tender zone from the lower lumbar region down to the coccyx. Chronic

irritative affections of the lungs and the pleura give rise, if at all, to tenderness from about the middle dorsal up to the altitude on a level with the middle cervical region.

Chronic painful affections of the pharyngeal zone, including subacute nasal and pharyngeal catarrh, give rise in some cases to tenderness in the region extending from the suboccipital to the middle cervical region. These are understood to be approximations to the truth, as determined from a clinical standpoint.

Such are the two principal groups into which cases of true spinal irritation may be divided, according to my observation,—all cases including, as already described, a lesion of nutrition with certain symptoms to which that lesion gives rise, chief among which are more or less persistent fatigue, pain, and hyperalgesia in the nerves of the affected zone, especially those that run the shortest course from the integument over the affected region of the spine to the spinal cord. If the remarks made as to the nature and conditions of spinal irritation are correct, they point out plainly the general line along which treatment, if successful, must be conducted.

Granting the existence of the nutritive lesion insisted upon, it is plain that the first and most imperative condition to be complied with is that of rest. If the spinal irritation can be traced either to over-use or to over-excitation, a first duty is to remove the cause by stopping the action, or by appropriate treatment of the irritative disease, which may be a morbid feature in spinal irritation, whether it be in the alimentary canal, or the genito-urinary tract, or elsewhere. The recognition of spinal irritation as having the nature and causes already specified, directs the observer intelligently to its causes. But, as already said, the first condition to be complied with is rest. In this way waste in the play of nutritive activities is diminished.

The second condition to be complied with is to give, by every means at command, a full supply of materials for a fresh impulse to nerve nutrition. Under this head is included, not only good feeding, but whatever is adapted to such cases in general, and to these cases in particular, in the way of tonics.

As respects irritative visceral disease, it need be scarcely said, after its existence and nature have been determined, that it calls for careful, effectual treatment. Gastric and gastro-duodenal catarrhs, irritative disease of the mucous membrane of the small intestine lower down, or of particular segments of the colon, the irritation produced by habitual constipation and consequent colic impactions, persistent disease of the rectum, or of the uterus, vagina, bladder, or other parts of the genito-urinary tract,—all should receive special attention. In this paper it is impracticable for me to describe the treatment adapted to each case. But it may be laid down as a law in the treatment of such cases, that unless the particular mode or kind of over-action or morbid excitation is not determined and rationally met, many of the cases are likely to remain, as they have always been, among the opprobria of practical medicine.

There are two special points in the treatment of this class of cases to which I desire to direct attention. The first of these relates to the persistent use of small doses of opium, either the watery extract, or the muriate or bimeconate of morphia, antagonized in either case by correspondingly small doses of a reliable preparation of belladonna, usually associated with the tonics given. The opium or preparations of its salts indicated are usually given by me without the knowledge of the patient, though not always so, and uniformly in small doses. Of the watery extract of opium, the doses given range from the twelfth to the sixth of a grain at a dose, twice daily or oftener. Of the morphia, the

dose is from a thirtieth to a tenth, twice or thrice daily, in connection with other remedies, also antagonized by moderate doses of belladonna, in doses ranging from the eighth to the twentieth of a grain of the solid extract. I am persuaded that but few members of the profession can be fully aware of the very great benefit to be derived from the use of opium, as just indicated, in painful affections of the nervous system. If it is properly employed I am convinced there is no danger of forming an "opium habit." In a large experience in its use by the mouth, I have not yet seen a case of the "opium habit" produced in the use of opium as just indicated. While its use does not entirely banish pain, it blunts the edge and usually inspires the patient (where it agrees) with a feeling of positive comfort, and, in many instances, actually improves nutrition.

The second point in treatment consists in the use of electricity, especially the electrical wire brush, generally using it at the positive electrode, the negative pole being at one or both feet of the patient. In connection with the local use of electricity, beginning in a very mild manner I have employed it at each sitting in a more general manner, the descending spinal current from the nape of the neck downward to the feet. In some instances, in using the electrical metallic brush, I have reversed the poles, using a mild current, thoroughly pencilled by rather rapid movements of the brush, at first, and making the movements of the brush slower as the sitting advances, directing attention chiefly, though not exclusively, to the sensitive zones of the spine. These sittings have been not oftener than once a day, usually, when practicable, in the afternoon. Sometimes I have used the galvanic, at other times a fine induced current from the second coil of a good induction machine. Combined with the bodily and mental rest I have uniformly directed more or less thorough careful massage, according to the case.

Such is a simple statement of the views at which I have arrived in regard to the nature and general modes of treatment of spinal irritation. I do not for a moment claim for them the merit of novelty. But they are fruits, in no unimportant sense, of personal observation and experience.

Reviews and Bibliographical Notices.

American nervousness : its causes and consequences.

A supplement to *Nervous Exhaustion (Neurasthenia)*. By GEORGE M. BEARD, A.M., M.D. New York : G. P. Putnam's Sons, 1881.

This latest volume of its prolific author takes up one aspect of an idea that has been the subject with which many previous authors have occupied themselves to a greater or less extent. The notion that the special physical and social conditions existing or supposed to exist in this country have been and are now modifying the race, is a popular, or, at least, is a common one in the popular mind. As a rule, it has been the popularizers of medical and ethnological subjects that have broached this opinion. It cannot be said to have a confirmed *status* as a scientific truth, certainly not when stated as broadly as is done by most of its advocates. It is generally assumed by these, that the change is one of degeneration to a certain degree, and that the modern American white man is, in his physique, at least, inferior to his European progenitors. It is not exactly satisfactory to a patriotic citizen to accept these views, but they are so frequently dinned into our ears by native alarmists and superficial foreign observers that, with the natural tendency to accept whatever ill is said as true, they have become almost matters of faith with a large proportion of our population. And now comes Dr. Beard with a work on American nervousness to show that a very inconvenient form of physical evil is almost peculiar to our country and people, and gives it all the weight that his name and reputation can command. It is worth while, therefore, to look over the arguments he brings forward in support of his opinions, and to see whether they are sufficiently convincing to establish American nervousness as a fact.

Dr. Beard begins his volume with a preface, in which he states, as an epitome of the philosophy of this work, eight propositions, which we reproduce, slightly condensed, as follows :

First.—Nervousness is strictly deficiency or lack of nerve force. This condition, with all its symptoms, has developed mainly within the nineteenth century, and is especially severe in the northern and eastern United States. It is to be distinguished in the sense here used from mere excess of emotion and from organic disease.

Second.—The chief primary cause of the development and rapid increase of nervousness is *modern civilization*, distinguished from the ancient by five characteristics ; steam power, the periodical press, the telegraph, the sciences, and the mental activity of women.

There can be little or no nervousness without civilization, and under its modern forms nervousness in its many varieties is inevitable. Among the secondary and tertiary causes of nervousness are climate, personal habits, indulgence of appetites and passions.

Third.—These secondary and tertiary causes are of themselves powerless to produce nervousness, except as they exist and are interwoven with modern civilization.

Fourth.—The type of functional nervous diseases is neurasthenia, which is closely related to certain functional nervous disorders, such as hay fever, sick headache, inebriety, and certain forms of hysteria and insanity.

Fifth.—The greater prevalence of nervousness in America is a complex resultant of numerous influences, the chief of which are dryness of the air, extremes of heat and cold, civil and religious liberty, and the great mental activity necessary and possible in a new and productive country under such climatic conditions.

Sixth.—Among the signs of American nervousness specially worthy of attention are the following : the nervous diathesis ; susceptibility to stimulants and narcotics and various drugs, and consequent necessity of temperance ; increase of the nervous diseases, inebriety and neurasthenia, hay fever, nervous dyspepsia, asthenopia, and allied diseases and symptoms ; early and rapid decay of teeth ; premature baldness ; sensitiveness to heat and cold ; increase of diseases not exclusively nervous, as diabetes and certain forms of Bright's disease and chronic catarrhs ; unprecedented beauty of American women ; frequency of trance and muscle-reading ; the strain of dentition, puberty, and the change of life ; American oratory, humor, speech, and language ; change

in type of disease during the past half century ; and the greater intensity of animal life on this continent.

Seventh.—Side by side with this increase of nervousness, and partly as a result of it, longevity has increased, and in all ages brain-workers have, on the average, been long-lived, the very greatest geniuses being the longest lived of all. In connection with this fact of the longevity of brain-workers is to be noted also the law of the relation of age to work, by which it is shown that original brain-work is done mostly in youth and early and middle life, the latter decades being reserved for work requiring simply experience and routine.

Eighth.—The evil of American nervousness, like all other evils, tends, within certain limits, to correct itself ; and the physical future of the American people has a bright as well as a dark side ; increasing wealth will bring increasing calm and repose ; the friction of nervousness shall be diminished by various inventions ; social customs, with the needs of the times, shall be modified ; and, as a consequence, strength and vigor shall be developed at the same time with, and by the side of debility and nervousness.

So much for the author's own summary of his views here stated. It will be unnecessary to attempt to notice each and every particular in a review like the present one, but we can well spare the space to examine a few of these leading propositions, which, in fact, form the subjects of the several chapters that make up the volume.

First of all is Dr. Beard's definition of nervousness, and why American nervousness. He tells us that it is strictly deficiency or lack of nerve force. This requires to fulfil the conditions of a satisfactory definition, a statement or at least an understanding of what is meant by nerve force, and lacking this it is deficient in every essential particular. Perhaps Dr. Beard has a clear idea of what he means by "nerve force," but he seems to assume that that is a term that requires no further definition, whereas it is, in fact, as vague and uncertain as vitality or neurility or any other phrase that indicates the limit of our knowledge. We cannot say with strict accuracy that a tendency to become quickly exhausted by mental exertion, or to succumb to minor nervous ailments, such as hay fever, etc., implies deficiency in any special force pertaining to the nerves, for the conditions are too complex and, so far, too little understood. Even the so-called neurasthenia is not to be defined simply by its other name, "nervous exhaustion," for

it has as causal factors an indefinite number of pathological conditions that can affect nutrition, and especially that of the nerve centres, and any such general term is misleading when employed to cover the whole condition.

But admitting Dr. Beard's definition of nervousness as a deficiency of endurance for exertions requiring what is called nervous strain and a particular liability to functional nervous disease, which is its signification from the context, it is a question whether it is properly any more American than it is cosmopolitan. It is not flattering to our national feeling to presume that, as a people, we are preëminently nervously weak and irritable, yet, if such is the case, it is a fact that will have to be endured. Dr. Beard rejects all statistics in regard to the increase of nervous disorders in this country, for the very good reason that there are none of any value, and relies upon general observation. He sees the signs of American nervousness in the long list of disorders, etc., enumerated in his sixth proposition, some of which are dubious supports to any theory of an especially "American" nervousness. It is a question, to say the least, whether many of these exist as peculiarly American characteristics, and whether, indeed, more than a very few of them are justly to be considered as such. We have never observed or been satisfactorily assured that Americans are more subject to nervous dyspepsia, myopia, baldness, to diabetes or kidney disease, or to trance, or more sensitive to heat and cold than the people of other parts of the world, certainly not more so than Europeans. The differences in our climate, and perhaps also those in our social conditions, from the analogous conditions in Europe, may be accountable for some of the items in the list, but these, among which we may perhaps include the alleged early decay of the teeth, and the chronic catarrhs of Americans, are not necessarily indicative of "nervousness." Others of these peculiarities are no more than could be expected from such a difference in latitude and longitude, and still others we do not believe exist as American characteristics to any such general extent as is here assumed. It is a little surprising to one who judges from general observation, as does Dr. Beard, to hear that thirstlessness is such a prominent peculiarity of our people; and how to refer "the intensity of animal life in America" to a lack of "nerve force" is still less easily to be understood. Indeed, Dr. Beard admits in one place that his remarks apply to only a small fraction of the American people, and we presume that his observations on even this fraction have been influenced by his preconceptions.

The "Causes of American Nervousness" are discussed in a chapter of nearly one hundred pages, in which the author dilates on the topics indicated in his fifth proposition. He states here a certain amount of truth, but says much that in our opinion is of little value, and would have been fully as well left unsaid. The next longest chapter in the volume is an expansion of an earlier essay by Dr. Beard, its subject being the longevity of brain-workers and the relation of age to work. The former paper was duly noticed in this journal, and we need only say that the opinions there expressed are still held by us. The essay has been rewritten and enlarged, but the main ideas are here the same as in the earlier article.

The concluding chapter, on the physical future of Americans, contains Dr. Beard's ideas of what we are coming to, and is, in a measure, encouraging. But, like all prophecy, it requires some faith for its acceptance, and as we do not fully admit all that he says in regard to our present condition, we may not accept his conclusions for the future. The chapter also contains the author's views on the subject of education, which are certainly extreme when judged by those practically applied at the present time. His expressions here seem to us frequently unfortunate, whatever he may mean by them. For example, such statements as "Ignorance is power as well as joy," "Even our sciences would seem to flourish best in the soil of ignorance and non-expertness," have a rather curious sound, but they occur here and are matched by others in the volume.

In conclusion we would state that the work is a popular rather than a scientific one, and, as the author states, it is a very proper sequel to his semi-medical treatise on nervous exhaustion. It gives what we think is an exaggerated view of some phases of American life, and makes wholesale generalizations from facts that exist to only a very limited extent in our population. We have not had, perhaps, all the advantages of observation in foreign countries that Dr. Beard may have had, but with a rather extensive acquaintance with our foreign-born population here, and some slight observation of the people of certain other political divisions of the globe on their own soil, we are far from being convinced that nervousness is so characteristically American as this work would make it appear.

The literary style of the work, as might be expected, is very good; it is very readable and entertaining. Its typographical appearance is also very good.

The mother's guide in the management and feeding of infants. By JOHN M. KEATING, M.D., Lecturer on the Diseases of Children at the University of Pennsylvania, etc. Philadelphia : 1881, H. C. Lea's Sons & Co. Chicago : Jansen, McClurg & Co.

The most perilous period of every individual's life is the first year of his or her existence. It is not a matter for wonder, therefore, that there should be an extensive literature on the hygiene of that period, and that it should be enlarged by very frequent additions. The one standard text-book on infant hygiene and medicine can scarcely be said to exist ; there are so many treatises of more or less merit on the subject. This latest volume is intended for the use of mothers and nurses who have the practical care and management of infants, and should, therefore, be a popular rather than a medical work. So far as we can see, its advice is safe and sensible. It does not, however, give all the information that may be needed at times, and, like all these little books, it is no substitute for a physician in cases of actual danger. It deserves a large circulation.

The wilderness cure. By MARC COOK. New York : Wm. Wood & Co., 1881.

This little book gives the experience of a consumptive benefited by a residence in the northern wilderness of New York, the Adirondack region, together with a large amount of valuable information in regard to that region, and the cost and methods of the plans of obtaining the benefit of the camp-cure for invalids. It is very entertainingly written, and will doubtless be widely read and help to build up summer (and winter, according to the author's recommendations) health-camps in John Brown's tract and the St. Regis region. Such are of great value to many invalids, not consumptives, though this book is addressed especially to that class, and in showing how, and how cheaply, it can be managed, provided the author's figures are correct, it may be of considerable service.

A treatise on albuminuria. By W. HOWSHIP DICKINSON, M.D., Cantab. Second edition. New York : Wm. Wood & Co., 1881.

Messrs. Wm. Wood & Co. have reproduced in their series for this year, Dickinson on albuminuria. As this is a second edition, and the former edition may be known to our readers, it is not necessary to say very much in regard to its contents. It treats solely

of pathological albuminuria connected with the various forms of nephritis commonly classed together under the name of Bright's disease, and is therefore not a complete treatise on all the conditions in which albumen appears in the urine. Every physician who makes a common practice of urine examination in his cases is aware that albumen often is met with when there is no reason to diagnose any serious kidney disease, and therefore the general assertion that, save in physiological alimentary albuminuria and that connected with certain hepatic disorders, when the urine contains albumen the kidneys are abnormal, if taken as meaning notably diseased, is misleading. The book does not contain all the results of the most recent investigations on the subject, but it is well written and a valuable treatise.

REVIEW OF FOREIGN PSYCHIATRICAL LITERATURE FOR 1881.

- I.—ARCHIV FÜR PSYCHIATRIE UND NERVENKRANKHEITEN.
- II.—JAHREBÜCHER FÜR PSYCHIATRIE.
- III.—ALLGEMEINE ZEITSCHRIFT FÜR PSYCHIATRIE UND
PSYCHISCH-GERICHTLICHE MEDICIN.
- IV.—CENTRALBLATT FÜR NERVENHEILKUNDE, PSYCHIATRIE,
UND GERICHTLICHE PSYCHOPATHOLOGIE.
- V.—ANNALES MÉDICO-PSYCHOLOGIQUES.
- VI.—ARCHIVES DE NEUROLOGIE.
- VII.—L' ENCEPHALE.
- VIII.—ARCHIVIO ITALIANO PER LE MALATTIE NERVOSE E
PIÙ PARTICOLARMENTE PER LE ALIENAZIONI MEN-
TALI.
- IX.—RIVISTA SPERIMENTALE DI FRENIAITRIA E DI MEDICINA
LEGALE.
- X.—BRAIN.
- XI.—THE JOURNAL OF MENTAL SCIENCE.
- XII.—THE JOURNAL OF PSYCHOLOGICAL MEDICINE AND
MENTAL PATHOLOGY.

That psychiatry has made any very great advance during the semi-annual period embraced in this review cannot be said. While some points in its clinical and forensic relations have been more clearly defined, while some new methods of treatment have received extended trial and commendation, it must be confessed

that in certain points the tendency has been apparently toward a retrograde rather than an advance. In the present review we shall attempt a survey of a portion of American, English, French, German, Austrian, and Italian periodical psychiatric literature from a purely critical standpoint. The subjects set apart for particular treatment cannot be said to be clearly demarcated. The topics to which special attention will be given are, first, the general clinical aspect of psychiatry; second, the therapeutic aspect of psychiatry; third, the special psychoses; and finally, the general pathology.

The subject of hallucinations is always one of great interest inasmuch as it has important forensic prognostic and diagnostic relations. Hallucinations, or to speak more properly, hallucinatory delusions are the *deus ex machina* of many of the acts of the insane. They therefore usually attract attention, and few collections of psychiatric works are destitute of extended treatises on this subject. The literature before us is by no means poor in this respect. Tamburini,¹ for example, raises the question as to the seat of hallucinations, and decides, in contradistinction to the opinions of Hammond² and Luys,³ that the optic thalamus is not the seat of lesion, but regards excitation of the cerebral cortex as their fundamental cause, at least of hallucinations which are unilateral. Tamburini could not have read a discussion in the New York Neurological Society, March, 1877,⁴ or he would not have set forth his conclusions as so purely original. In the essential part of his conclusions he has been anticipated by Spitzka, as witness the following quotation: "The true explanation of a hallucination would therefore be that in an intact cortical territory, through anomalies in its vascular supply, an old impression is awakened with life-like vigor, that an electro-negative oscillation takes place analogous to the one occurring when the actual impression was first registered." This states Tamburini's theory with even more clearness than he himself has done. Kaudensky⁵ has described a well-marked case of monomania (*primäre Verucktheit*) with systematized delusions and hallucinations, the pathological basis of which is described as being a "loss of capacity on the part of the frontal lobes, with increased excitability,

¹ *Rivisti Sperimentale*, Fasciculus one and two, 1880.

² *JOURNAL OF NERVOUS AND MENTAL DISEASE*, vol. iv, p. 321.

³ *Gazette des Hôpitaux*, No. 142, 1880.

⁴ *JOURNAL OF NERVOUS AND MENTAL DISEASE*, April, 1877, p. 321.

⁵ *Archiv für Psychiatrie*, Band xi, Heft 3.

at the same time, of the cortical or infracortical sensory centres." While the first part of this opinion cannot be sustained, the second is in full accord with the views of Tamburini and Spitzka just quoted. Pick¹ describes a case of a patient who to the etiological influence of marked heredity added syphilitic infection. The patient, although having some optimistic delusions, exhibited, in addition, marked hallucinations of touch, hearing, and sight. He complained of being subjected to an electric machine and being burnt on his feet. These hallucinations of general sensibility evidently arose in a manner indicated in a communication to this Journal,² namely, by the intense mental concentration of the patient on sensations produced by his luetic condition. The patient had, besides these, hallucinations of hearing and "partial" hallucinations of sight; the patient had a defect in the visual field, and saw but half the hallucinatory object. These hallucinations of sight were confined to the right side of the field of vision, and evidently originated in a similar manner to the hallucinations of touch. Pick referred the affection to a lesion affecting the posterior portion of the internal capsule; a pathological localization difficult or impossible to justify. In marked contrast with the views of Tamburini are those of Baillarger, who reports the case of a man, aged 83, who, although blind, had for two years (subsequent to two unsuccessful operations for cataract, and following these an attack of cerebral congestion) periodical hallucinations of sight which lasted thirty-six hours. Baillarger claims that the patient fully recognized the delusive nature of his hallucinations, and from this and the fact that hallucinations were confined to one sense concludes that in the production of hallucinations both a sensorial and a psychical element are required. This conclusion does not logically follow from the facts given. That the patient had not had hallucinations of touch, and that the hallucinations did not become delusions, simply shows that a psychical element was wanting, and no more. Of similar nature to this is the reasoning of Regis,³ who cites five cases in which the hallucinations were persistently unilateral, which Regis claims demonstrate the proposition already quoted from Baillarger, that for the production of hallucinations a sensorial and a psychical element are required. His cases prove that sensorial defects may exert an influence in the production

¹ *Fahrbücher für Psychiatrie*, Band ii, Heft 3.

² JOURNAL OF NERVOUS AND MENTAL DISEASE, vol. viii, p. 458.

³ *L'Encephale*, vol. i, No. 1.

of hallucinations, but nothing more, and more especially not, that hallucinations always require sensorial defect for their production. As an example of Regis' reasoning, the following may be given: "Even if it be admitted that the faculties of imagination and memory may reproduce an idea or a remembrance with the characteristic phenomena of a normal sensation, so that the individual attacked regards himself as having received a true sensorial impression, no reason could be assigned why in certain cases an individual would constantly refer to a sense organ of one side a phenomenon of purely intellectual nature."

This reasoning can be said to lead only to the conclusion, to which reference has been already made, that in certain cases the sensorial defect enters into the formation of a hallucination. I have, however, seen cases of unilateral hallucinations in which a defect of the sense-organs could not be detected by the most extended examination. While the views of Dr. Regis are entitled to all respect, and while no considerations other than those of scientific truth are of any weight in deciding the matter, still the serious consequences attending the acceptance of this sensorial doctrine should impose a rigid examination of the facts on which it is based. It certainly shows the influence of the "reflex" school of neurologists so numerous in France. It is safe to predict that not a few murders will be committed by lunatics, "whose sensorial basis of hallucinations" has been removed by devotees of the Regis theory. Regis is a disciple of Ball, and the latter is a full-fledged alienist, without previous training, on being elevated to a position for which his previous studies by no means fitted him. Another disciple of the Ball school, Semon,¹ endeavors to show that a conception which an insane patient has thought aloud is a "psychic hallucination." The attempt is by no means a success, and exhibits but little psychological knowledge. The endeavor bears the impress of diletantism. In regard to the literature of hallucinations it cannot be said that it exhibits any thing but a retrograde tendency, Tamburini, Pick, and Laséque excepted, who have endeavored to maintain what is certainly the scientific view of the subject. Needham² and Savage report under the head of "contagiousness of delusion," cases which are evidently *folie à deux*, and which certainly add force to the opinion,³ elsewhere expressed, that asylum treatment, by reason of bringing

¹ *Lyon Médicale*, November 25 and December 5, 1880.

² *Journal of Mental Science*, January and April, 1881.

³ *JOURNAL OF NERVOUS AND MENTAL DISEASE*, vol. vii, p. 643.

insane patients into close relations with each other, exerts, at times, an injurious influence. The cases cited in Needham's article were two brothers, the younger of whom was the recipient of the delusion, being the weaker intellect. The originator of the delusion died, but the recipient still continued to accept it as true.

Savage's cases are very similar, except that in one, the delusions have extended from the father to his son, and then to the latter's wife, who is sane but stupid.

Psychiatrists who have approached the subject of psychiatry from the standpoint of the study of alcohol exhibit very curiously the influence of a bias of this kind in whatever else they attempt. Magnan,¹ for example, claims that varied psychoses may exist in the same individual, a claim that is strictly correct, but he adds to this a bizarre attempt to show that these varied psychoses are directly inherited. Thus, the father in one case, at once epileptic and melancholic, having been an alcoholic, the patient inherits from him epilepsy, as, according to Magnan, alcoholism in the parent produces epilepsy in the offspring; at the same time the patient's mother being a melancholiac, he inherits from her his melancholia. This is certainly bolstering up one hypothesis by another, and what little influence for good the article is likely to have is destroyed by this vague method of reasoning. Another curious attempt at explaining certain morbid psychological phenomena is that of Des Courtis,² who tries to show, by the citation of certain cases, that the two cerebral hemispheres can act independently of each other. The cases, who are paretics principally, if not entirely, carry on conversations in two persons, and this phenomenon, which Ball, who is at the bottom of much of this fanciful but not ingenious psychiatry has dubbed *des-equilibration*, is frequently found in cases of progressive paresis. Many cases of the same kind have come under observation on this side of the Atlantic, but admit of a more prosaic explanation than that given by Des Courtis. The great psychological phenomenon presented by the parietic is, as Spitzka³ has pointed out, a loss of his proper self-consciousness. Now, it is noteworthy that many of the parietic's delusions originate as gasconading, but, owing to his imperfect associating mechanism, are accepted finally as healthy. Children often indulge in this habit of speaking in two persons to placate some one they have offended, or to give a support to some

¹ *Archives de Neurologie*, vol. i, No. 1.

² *L'Encephale*, vol. I, No. I.

³ *JOURNAL OF NERVOUS AND MENTAL DISEASE*, vol. iv, p. 273.

pretension. The child whose associating mechanism has not been trained, and the parietic whose associating mechanism has been impaired, are on the same plane. A formula of speaking in two persons, which the parietic adopts in a spirit of gasconading, is continued as a matter of fact, and for lack of correction by the proper associating mechanism. To some such mental operation as this can be safely referred the phenomenon that seems to Des Courtis to require the action of both cerebral hemispheres. Sufficient clinical evidence can be found to support this view at a fitting time and place.

A similar evidence of this fanciful psychiatry is to be found in Ball's¹ article on cerebral impulses, in which he endeavors to show that an impulse which seizes men ordinarily healthy as regards mentality to wander from the subject in which they are supposed to be interested, is of a morbid type. Any medical society will furnish numerous examples of the phenomenon in question, but the pathological element of it is not at all clear, and Ball's attempts at reducing it to this basis are not successful.

Dagonet,² in an article considerably tinctured by a sacerdotal spirit, attempts to consider conscience from a psychiatric point of view, but the article is of little interest from either a psychological or psychiatric standpoint. In many respects far superior to this is Laségue's "evolution of delusions of persecution." According to him³ this class of delusions are the most subjective of all delusions, and have nothing concrete at their inception. Laségue, however, is not sufficiently definitive here, as he is evidently speaking, not of the delusions of persecution pure and simple, but of these delusions as found in melancholia. Sadness precedes the delusions of persecution in melancholia, but the reverse is the case in many of the delusions of persecution as found in other psychoses. A man claims to be a king, and is incarcerated in an asylum. From this a delusion of conspiracy results, and he becomes sad. It cannot be said that in this latter delusion there is nothing concrete, nor can it be said to be purely subjective; yet it may be, and often is, a well-marked delusion of persecution. Laségue has fallen into an error common to many superintendents of insane asylums, considering delusions of persecution and melancholia as almost synonymous. Laségue differs, as most psychiatrists are likely to differ, from the Ball school, in

¹ *L'Encephale*, vol. i, No. 1.

² *Annales Médico-Psychologiques*, May, 1881.

³ *Ibid.*, January and March, 1881.

believing that hallucinations may be of purely psychic origin. He classifies the hallucinations occurring among the insane of this class as of two great types, one initial or casual, the other consecutive or terminal. Among the English-speaking psychiatrists the first is usually called an illusion arising from the misinterpretation of an actual perception. The evolution of the other type of hallucination is, according to Laségue, as follows: "The patient reasons that among the numerous ideas which strike him there are some the origin of which he recognizes, and some which he does not. There are for him, then, two individualities, one of which is himself and the other is a he which is not and is himself, a species of parasitic being which has taken control over him. It is he who commands, maintains, and ordains, and the patient is unable to detach himself from this parasite. How has this new 'ego' obtained control over his thoughts and imposed on him his will? By the ordinary process of thought? No, but by something or some one which speaks to him. When the patient has obtained this formula, he has the explanation of his condition. The auditory hallucinations form as a means of communication between his thought and that of the parasite, which interferes in his existence. It is an elaborated transition between the ideas of self and the idea of another." The great defect of this article is the absence of a distinction between systematized and unsystematized delusions.

Roth,¹ in an elaborate article, attempts to trace a relation between temperament and insanity, which he regards as well established, but which is so illy defined as scarcely to be of value.

A case² illustrating how long certain cases of monomania may live has been recently reported from England. A patient developed marked symptoms of insanity at eighteen, and died after an asylum sojourn of sixty-six years. A somewhat similar case occurred at the New York City Asylum for the Insane. A patient entered the asylum in his seventeenth year and remained till his death, which occurred at the age of eighty-three.

A paper³ which has attracted some little attention in the United States, and which is founded on an English paper on the same subject, is one on certain facial hairy growths among insane women, by Dr. Allan McL. Hamilton. The conclusion of this

¹ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 3.

² *Medical Times and Gazette*, February 19, 1881.

³ Significance of facial hairy growths in insane women. *Medical Record*, March 12, 1881.

paper, that facial hairy growths among young insane women have a bearing on prognosis, is vitiated by the fact that social peculiarities have been disregarded. The paper, curiously enough, contains an admission that asylum histories are very imperfect,—a matter strenuously denied by its author on several occasions. The paper is certainly a contribution of value to the much-neglected study of trophic conditions in the insane.

The mental condition of Martin Luther has been frequently discussed, but the subject seems to be ever attracting new investigators. Berkhard¹ considers Luther's mental and nervous condition. He regards him as suffering from the effects of overwork, and while many well-known facts in connection with Luther's life are quoted, the hallucinations of Luther after marriage with Katharine von Bora seem unknown to Berkhard. After all, had Luther lived in the nineteenth century, his vigorous intellect would not have failed to demarcate between subjective and objective sensations, even though he were suffering from overwork.

Passing from the subjects already quoted, which are capable only of being included in general psychiatry, we come to questions of etiology, and of cases bearing on this point the present literature is quite full. Siemens² has had the opportunity of examining cases of insanity due to ergot. A six-year-old boy and a woman exhibited optimistic, auditory, and visual hallucinations. One of the remaining cases exhibited symptoms of melancholia; the others dementia, with maniacal exacerbations. The general intellectual condition was that of depression, with the exceptions mentioned. Even the so-called maniacal outbursts were really melancholia, with frenzy. All the patients recovered. Siemens' terms are somewhat indefinite. The article would be more valuable if the psychoses were properly classified.

Kræpelin, in an interesting article on the relations of acute diseases to the psychoses, discusses, first, the relations of intermittent fever, which he finds produces, as a rule, an active melancholia, but in a quarter of the cases mental conditions varied from apathetic melancholia to maniacal exaltation. At times these psychoses are of a periodic type, and the prognosis is, as a rule, favorable. The existence of a predisposition is of course necessary. He next takes up the question of rheumatism, and claims that at certain seasons rheumatism is more frequent than at others, so that at times a number of cases may appear together. He quotes

¹ *Archiv für Psychiatrie*, Band xi, Heft 3.

² *Archiv für Psychiatrie*, Band xi, Heft 1 and 2.

Rigler as saying that rheumatic cerebral complications are most frequent in Turkey.

He divides insanity as produced by rheumatism into the following classes : First, the hyperpyretic form, the most acute variety, the initial symptoms of which are insomnia, talking in sleep, slight delirium, followed by severe delirium later ; after a rise in the temperature death results ; with continued rise in the temperature the prognosis is bad, only 18 per cent. recovering ; the disease is sometimes complicated by facial spasm. Second, less acute delirious cases occurring during the first week of the disease, rarely during the second week ; usually comes on with maniacal excitement at times, though rarely with melancholic frenzy ; collapse or death occurs in over one half the cases. Choreic complications occurred in a few cases. Three cases recovered after spontaneous epistaxis. Third, a form which requires for its production, in addition to the exciting cause—rheumatism,—certain predisposing causes—anæmia, alcohol, or heredity. This form is divisible into two great symptomatological groups. I. Active melancholia, with fright and suicidal tendencies, sometimes accompanied with choreic movements and vertigo. The prognosis is not very favorable. II. The other symptomatological group lasts three or four months, presenting symptoms of confusion with depression, sometimes chorea and sitophobia, *always* with hallucinations. Four cases recovered ; one died.

While this system of classification seems very thorough it cannot be so regarded, as the influence of rheumatism on already existent psychoses is not considered. In the third division of his article he considers the influence of pneumonia and pleurisy in the production of the psychoses, but these two latter influences exercise a slight effect, except indirectly, through producing fever or asthenia. The whole article is a valuable one. The relations of syphilis to the production of insanity is always an interesting question, and to its discussion Ripping¹ devotes a somewhat lengthy article, and regards the direct and solitary influence of syphilis in the production of insanity as being of rare occurrence, syphilis being aided by other causes. The article is rather pretentious and somewhat authoritative. He has not met with the form occurring during the second period. Schaefer² agrees to a great extent with Skene,³ but his article is much more scientific, consid-

¹ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 6.

² *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 1.

³ *American Journal of Obstetrics*, January, 1881.

ered from the standpoint of psychiatry, than that of Skene. He finds that five principal classes of morbid mental phenomena are produced by sexual disorders in women. Simple insanity, insanity developed from hypochondria, sudden insanity with numerous hallucinations, primary insanity, an abortive type of insanity with fixed conception. The terms adopted are not very well suited to demarcate clinical forms. The simple forms are those like pure melancholia and mania. The sudden insanity is a species of mania transitoria or melancholia furibunda; the remaining terms fully explain themselves. Skene, in his article, traces too much to the influence of the ovaries in the production of insanity, and adopts the ovarian theory of hysteria, a theory that has pretty well received its *coup de grâce*.

The subject of the influence of saturnism has been discussed at some length by Bartens,¹ who claims that the psychoses produced by lead are both of an acute and chronic type. The acute type is a species of mania transitoria, or more properly melancholia furibunda, with great incoherence and very vivid hallucinations of sight and hearing. In a few cases the type presented is that of melancholia attonita. The chronic type presents hallucinations of taste, touch, sight, and hearing. The patients are suspicious and have delusions of persecution. Some present the physical phenomena of progressive paresis. The prognosis in the acute type, Bartens claims, is by no means unfavorable, two thirds of the cases having recovered. Paralytic and choreic complications are not rare, and the maniacal furor is at times not unlikely to lead to death from exhaustion. The prognosis of the chronic type is, of course, unfavorable as regards both life and recovery. To Bartens' use of the term mania transitoria the objection exists that the term has been applied to a distinct form of insanity, and its use in this relation tends to create confusion. The chronic types of lead insanity have exhibited a tendency to end in progressive paresis, according to some observations elsewhere reported.² Verga³ attempts, in an extended article, to draw a relation between meteorological perturbation and agitation of the insane. While his general conclusion that such a relation exists is probably correct, it cannot be said that his arguments and cases are so free from elements of error as to be even relative proof of it.

¹ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 2.

² JOURNAL OF NERVOUS AND MENTAL DISEASE, July, 1881. Psychoses from lead.

³ *Archivio Italiano per la Malattie Nervose*, May, 1881.

The therapeusis of insanity is like therapeusis in other branches of medicine—a rather unsatisfactory subject. Friedmann¹ takes up the question of hydrotherapy. He uses, in torpid atonic cases, the douche to such an extent as to be stimulating, and generally washing of the body is also used. Hip and sitz baths are given in cases of an anomistic tendency. Wet packing is used with good effect in the more acute types unless contra-indicated by heart failure, tuberculosis, etc. The extreme douche is used by him with favorable results in the irritable, noisy, and sleepless. This subject is one to which too little attention is paid in the United States and extended trial of hydrotherapy could not fail to be rewarded.

The use of hyoscyamine seems to be spreading. Savage,² Seguin,³ Seppili and Riva,⁴ and Reinhardt⁵ have been all investigating. The conclusions of Seppili and Riva, Reinhardt and Savage, are, to a considerable extent, the same, and simply amount to the expression of conclusions that hyoscyamine is of value as an hypnotic. Seguin's conclusions cover more ground and, therefore, deserve more extended notice. These conclusions are as follows :

1. Hyoscyamine acts as a mydriatic, but whether more fully or larger than atropia, remains to be settled.

2. When given in small doses it reduces the cardiac pulsations, increases arterial tension, and checks the loss of body heat. It also produces hallucinations and delirium. It may cause a fall of axillary temperature, and also produces a rash.

3. In large doses it immediately increases the pulse rate, produces a seeming paralysis or motor debility, and sleep.

4. Hyoscyamia is indicated in mania, restlessness, delusions of persecution, dementia with agitation and destructiveness, epileptic mania, insomnia, rapid action of the heart, epilepsy (?), status epilepticus, chorea, paralysis agitans, hysterical spasms, tremor, neuralgia, rapid pulse, etc.

5. In mania and allied states it produces sleep as certainly, or even more certainly than chloral, without any evil after-effect, unless it be an occasional gastric disorder.

6. In cases of *delusion of persecution or suspicions* it has produced an absolute cure.

7. In paralysis agitans it achieves what no other remedy ever

¹ *Mittheil. der Verein der Aerzte in Neider-Oesterreich*, one and two, 1881.

² *Journal of Mental Science*, April, 1881.

³ *Archives of Medicine*, April and June, 1881.

⁴ *Rivista Sperimentale*, 1881.

⁵ *Archiv für Psychiatrie*, Band xi, Heft 2.

has done, viz., arrests the movements for four hours or more without insensibility.

8. In the status epilepticus it shortens the attack materially, perhaps better than any other single remedy.

9. It is a diuretic of no mean power.

10. The curative power of hyoscyamia does not appear to be great. In some cases of insanity its use has been followed by recovery, but as a rule we must look upon it as a good narcotic, often speedier, more complete, and less objectionable than morphia and chloral hydrate. In spasmodic diseases we can speak of hyoscyamia only as an ameliorating agent or as a palliative.

The conclusions that are most striking in the above are the third and sixth. Leaving aside the question of psychiatric classification, of which the crudeness is somewhat remarkable, the assertion in regard to delusions of persecution certainly calls for comment. Which type of delusions of persecution is meant? The one found in monomania resulting from incarceration in a lunatic asylum, or some similar logical reason? The one found in melancholia, or the one found in progressive paresis? The delusion in monomania is a somewhat complicated process of thought, and can any one claim that this can be swept away by a single drug? The idea is absurd. As well might one have attempted to remove the "terror" of the French during the first revolution by doses of hyoscyamine. Melancholia is a condition in which belladonna and the other mydriatics are strongly contra-indicated, and on it hyoscyamine could have but a depressing effect. The delusions in progressive paresis shift and vary so much that it would be difficult, nay, impossible, to prove that their disappearance was due to any one drug. It may, therefore, be safely said that this alleged action of hyoscyamine has been rather too hastily accepted. In point of fact, the tenth and sixth conclusions are somewhat contradictory on this point. The same criticism applies to the conclusion in regard to epilepsy, for some of the researches on which it has been based have been shown in a court of justice to be valueless. While hyoscyamine is undeniably valuable, it certainly owes its present great prominence in psychiatric therapeutics chiefly to fashion.

Baillarger¹ reports a case of hallucinations of alcoholic origin which recovered by the use of wine of aloes. The case is, however, very imperfectly reported, and if any benefit was attained by the use of aloes, it could be only from its derivative action. The

¹ *Annales Médico-Psychologiques*, May, 1881.

results in the case scarcely merited the prominence which has been given it. Baillarger seems to have an ability in the production of good results by medical treatment, for he reports a case in which hallucinations made their appearance during the night, vanishing during the day, developing into violent mania, which was treated by sequestration and sulphate of quinine in large doses, which measures were followed by recovery. He pronounced the hallucinations intermittent, and acting on this idea, poured in quinine in fifteen-grain doses. While this treatment, considered from the principle on which Baillarger based it, is absurd, there can be but little doubt that in conditions where hallucinations of the ear are present, apparently produced by vaso-motor spasm, quinine in large doses might be of benefit. The principle of treatment is what is objectionable in this case, not the treatment itself. The procedure of Baillarger in this case reminds one very forcibly of the scenes at the death of Charles II, where the physicians, after quarrelling as to whether his disease was epilepsy or apoplexy, finally decided to call it a fever and throw in bark.

Voisin¹ has recently described many cases of melancholia treated with remarkable success by means of chlorhydrate of morphia. While the results he has given seem very brilliant, it is obvious his enthusiasm has carried him away, and that many of his alleged cures were temporary ameliorations, and his results will certainly do harm by encouraging amateur alienists to call hypochondriasic conditions melancholia, and treat the same with chlorhydrate of morphia. Morphia well used in psychiatry is an agent of great value, but clinical demarcation of the psychoses is necessary before the remedy can be tried. Depression exists in melancholia; here morphia is of advantage. But depression also exists in progressive paresis and epileptic conditions, not to speak of monomania; here morphia is worse than useless. The article is of much value when used with a little caution. Winn,² who is one of those very conservative superintendents not yet reformed away in England, discusses the prophylaxis of insanity in a manner strongly suggestive of the Utica sages, and cites, in support of his ideas, which are neither very luminous nor original, authorities of more than doubtful value. The article seems to be made up after the fashion of the famous Pickwickian Chinese metaphysics. The author has read up for prophylaxis under the letter *P*, and insanity under the letter *I*, and combined his infor-

¹ *Bulletin Generale de Therapeutique Medicale et Chirurgicale*, May 30, 1881.

² *Journal of Psychological Medicine*, January, 1881.

mation with wonderful results. That such articles emanate from superintendents speaks strongly as to the necessity for prophylaxis, not for the benefit of the patient but for the benefit of the superintendent.

Regis,¹ Lailler,¹ and Erckhardt² discuss the question of forced alimentation of the insane with clearness, but add nothing new to the subject.

The French³ have been discussing non-restraint in the treatment of the insane, and, like Conolly himself, but unlike certain American pseudo-reformers who have made canting promises and pretenses, believe that in certain cases a limited amount of restraint is of undoubtedly great value. It is interesting in this connection, however, to read that the famous Utica crib, which originated in its first crude form in France, is thus disposed of by the *Annales Médico-Psychologiques*: "The crib originated by Aubanel has been long since abandoned in France, and is there regarded as a useless and dangerous appliance."

'Schüle'⁴ proposes to treat the unclean insane by a carefully regulated system of baths, and proposes to inaugurate for them certain regular habits of defæcation, etc. The ideas proposed are certainly practicable, but have suggested themselves to the majority of even the laymen who are employed about the insane.

Stenger,⁵ Lelut,⁵ and Mabilie⁶ deal with the question of the treatment of insanity by extended antiphlogistic or counterirritant treatment by producing profuse suppuration. In progressive paresis the apparent good effects ascribed by them to the treatment might be due simply to remissions, and the treatment, to say the best, useless. In monomania (*primäre verrücktheit*) there is no good to be anticipated from this species of treatment. It is possible that certain cases of insanity have been benefited, but the *laissez aller* system is certainly preferable to these active therapeutic measures.

Curwen,⁶ whose malfeasance in office led to the loss of his position, discusses the propositions of the Asylum Association, as if these constituted the *summum bonum* of all human medical wisdom. This contains the usual hypocrisy of the Association. He

¹ *Annales Médico-Psychologiques*, January, 1881.

² *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 2.

³ *Annales Médico-Psychologiques*, November, 1880.

⁴ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft.

⁵ *Annales Médico-Psychologiques*, November, 1880.

⁶ *Alienist & Neurologist*, January, 1881.

declares, in discussing the first proposition, that a knowledge of general medicine is not necessary. His premises would lead, and lead very surely, to the one conclusion, that a layman at the head of an insane asylum would be of equal value with a medical man, and taking himself and most of his colleagues only into comparison he is certainly right. He, of course, opposes the cottage system of treatment, to whose value his colleagues, Dr. Catlett, of Missouri, and Dr. Bucke, of Toronto, have borne such striking testimony. In many points this total ignoring of the spirit of the age and of all progress is an interesting psychological problem, showing the evil influence of asylum incarceration on a mind incapable of rising above the petty details of building, cooking, etc. The article illustrates the fact that whatever evil the removal of a public officer occasions, these evils were at their minimum when Dr. Curwen lost his position. From treatment we pass to the subject of the special psychoses.

Dr. Clouston,¹ in an interesting article, discusses the relations of puberty and adolescence, and considers the influence of diet on the sexual impulses. The article is rather a hint as to the prophylaxis of puberty, and certainly deserves widely extended republication, as the period of puberty, psychologically speaking, is one of the critical epochs in human life. Buch² and Scholtz³ analyze primäre Verrücktheit, monomania of Spitzka, primary intellectual insanity of other authors, but beyond exhibiting the symptoms of this psychosis in a somewhat clearer light than usual, add nothing of value to the general literature of the subject. Monomania is a subject always of great interest, more especially at the present time when a patient afflicted with this type of disease has attempted homicide. The history of that attempt is only a repetition of many similar cases, and shows that asylum isolation is most needed and most difficult to apply to a certain class of very dangerous patients. Russel⁴ discusses melancholia in a manner that very fully indicates he has no clear conceptions on the subject. He has confounded, like most asylum superintendents, melancholia and depressing delusions, and cases are described by him as melancholia which are hypochondriacal monomania, a condition clinically and pathologically distinct from melancholia. Russel is, however, very sound on the suicidal tendencies of melancholiacs,

¹ *Edinburgh Medical Journal*, January, 1881.

² *Archiv für Psychiatrie*, Band xi, Heft 2.

³ *Berliner Klinische Wochenschrift*, No. 33, 1880.

⁴ *Alienist & Neurologist*, April, 1881.

and if his suggestions were heeded by his colleagues many lives would be saved.

Bourneville and D'Olier¹ quote from Delasiauve the following as expressive of their views of the psychology of epileptic dementia, or rather of dementia generally, of which epilepsy is a very frequent cause: "Varying with the gravity of the mental condition the *attention* is enfeebled and null; *memory* is confused, untrustworthy, and at times entirely lost; conceptions are obscure, abortive, or false; following a train of thought is painful, incorrect, and impossible; imagination is not markedly developed. From this intellectual mutilation results, as a matter of course, moral enfeeblement." The observations forming the basis of this are believed by the authors to justify the conclusion, that at times epileptic dementia is not characterized by any marked lesion, though in other cases very decided lesions exist. These latter lesions are very similar to those encountered in progressive paresis. They differ however, in many important points; thus, Brissaud has not found miliary aneurisms in three cases which he studied with much care.

Witkowski² makes general criticisms of the subject of epilepsy, characterized by the rather authoritative air with which the author disposes of many vexed questions. He claims, and a negative statement of this kind seems of no value, that no one who has had large experience can come to any other conclusion than that pure psychic equivalence of epilepsy is an occurrence not established on a very firm basis. Were Dr. Witkowski an interne of the New York City Asylum for the Insane, he would be soon convinced from his personal observations that there is such a thing as a pure psychical equivalent of epilepsy without any motor phenomena whatever. This author, like one of the editors of the *Archives de Neurologie* (No. 2, page 320), has a very imperfect knowledge of the psychology of epilepsy, and both seem unacquainted with the labors of Falret and Samt, Sommer³ classifies the postepileptic psychoses into: Doubtful mental conditions, hallucinatory delirium: 1. With depressing delusions. 2. Delusions of persecution. 3. Anxious and impulsive delusions. 4. With expansive delusions. Many of the cases reported are cases of monomania complicated by epilepsy, and a fairly valuable critical analysis has not been made. Sommer could teach Witkowski and a few French psychiatrists, however,

¹ *Archives de Neurologie*, No. 2, 1880.

² *Allgemeine Zeitschrift für Psychiatrie*, Band xxxviii, Heft 2.

³ *Archiv für Psychiatrie*, Band xi, Heft 2.

the exact meaning of terms, as the words psychical equivalent are used, and used properly in the whole paper, as witness the following table.

	MALE.	FEMALE.	TOTAL.
Pre-epileptic psychic disturbance occurred in	2	3	5
Postepileptic psychic disturbance occurred in	27	7	34
Pre- and postepileptic psychic disturbance in	11	2	13
Equivalent alone	1	1	2
Equivalent pre- and postepileptic psychic disturbance occurred in	7	2	9
	48	15	63

The table illustrates a fact which has been observed by other authors, that postepileptic psychical disturbances are of greater rarity than the other types of epileptic psychoses. His observations do not tend to confirm the opinion generally expressed, even by neurologists of some note, that the percentage of epileptics becoming insane is relatively small. Pick¹ narrates a very interesting case of psychic equivalence of epilepsy, and comes to much the same general conclusions as Samt, Falret, Krafft-Ebing, and Spitzka, that this condition is a clearly demarcated one, the patient presenting the type of the *grand mal intellectual* of Falret. With this concurrent testimony to the value of the conclusions of Falret, it is a little difficult to understand why they have been so much ignored. Heimann² takes up the epileptic question from an interesting standpoint, a casuistical discussion of the history of six insane criminals, in which the relationship between criminality and early epilepsy is traced in a very clear and convincing manner. Heimann like a thorough clinician, makes the term epilepsy a very comprehensive one. All the patients described by Heimann had marked hereditary defects, and of the early history of these patients he gives the following table :

Case one was epileptic as a child, and became a criminal at the age of twenty-six years, after displaying the usual moral phenomena of insane epileptics. Case two was also an epileptic in early childhood, and became a criminal at the age of fifteen. Case three had a similar history, becoming a criminal at the age of sixteen. Case four became epileptic at fourteen, and criminal at sixteen. Case five became a criminal at the age of thirty-four,

¹ *Archiv für Psychiatrie*, Band xi, Heft 1.

² *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 5.

and was epileptic from childhood. Case six was epileptic in childhood, and criminal at twenty-one. Insanity and irresponsibility were judicially recognized in the first case at the age of twenty-eight, two years after the first crime ; while in case two irresponsibility was recognized half a year after the first crime ; in case three, at the age of forty-seven, thirty-one years after the first crime ; in case four, at the age of thirty-one, seven years after the first crime ; in case five, at the age of thirty-nine, five years after the first crime ; in case six, at the age of twenty-one, three months after the first crime. The mental phenomena presented by these patients were : Case first, slight degree of incoherence, weak judgment, defective memory, abnormal sensibility. The second case, whose irresponsibility was soon recognized, presented, according to Heimann, that much disputed psychosis, moral insanity. The third case was simple weakmindedness ; the fourth, diminished intellectual power ; the fifth, imbecility and dementia ; and the sixth, imbecility.

The first symptoms of insanity were recognized in the first case one year after the first crime, one month before an epileptic attack. The symptoms in the second case were recognized one month after the first crime, one year after an epileptic attack. No evidences of insanity were discovered in the third case until twenty-nine years after the first crime, two years before an epileptic attack. The fourth case was not considered as insane until six years after the first crime, one year after an epileptic attack. In the fifth case no symptoms were discovered until five years after the first crime, one month before an epileptic attack. In the sixth case the symptoms were noticed one month after the first crime, shortly before an epileptic attack. Plaxton¹ discusses the question of the criminal insane, but, after all, adds nothing new to the subject. His conclusions are sound, and oppose the treatment of insane as criminals simply because they have committed a criminal act. The criminals who *a priori* are such, but become insane, certainly should be treated in a criminal asylum ; but the patient who, through insanity, commits a criminal act most assuredly should not. If his responsibility be complete, to commit such a patient to a criminal asylum would be to punish for a crime of which he has been declared not guilty through insanity. Cognate to this question is the subject of the treatment of criminals who have become insane. Perhaps it would be as well this class of the insane should be treated in an asylum placed as much as possible under

¹ *Journal of Mental Science*, April, 1881.

prison auspices, as the moral effect would certainly do much to restrain the mischievous tendencies which many of these patients develop.

Channing¹ has also discussed this subject, but rather in the spirit of the Asylum Association and permeated by their prejudices. Apart from these prejudices the position taken in the article is relatively sound, and fully in accord with the opinions already expressed. Karrer² discusses circular insanity. He has had under observation ten cases, of whom four were male and six female. The cases reported by Dittmar, Krafft-Ebing, Flemming, Kelp, and others quoted, amount to about equal proportions of the sexes. L. Meyer believes that the proportion of males and females is about the same. The experience of the city asylums of New York would lead to the conclusion that more males than females are attacked by this psychosis, but that the figures on which such a conclusion would be based cannot be said to be beyond impeachment. The classification of the psychoses adopted by Karrer is much the same as that of Spitzka:³ 1. Mania, melancholia, mania. 2. Mania, melancholia, free interval. 3. Mania, free interval, melancholia. But the differences are not as clearly outlined. The article is a contribution to the clinical history rather than the casuistry of the disease.

Reich⁴ has had under observation four boys, six to ten years old, who had developed a transitory form of insanity under the following circumstances: They had been skating on the ice at a temperature below zero, when, on re-entering the house, which was heated to a high temperature, they were seized an hour after by a maniacal furor, with hallucinations, after which came a slumber, on waking from which they were perfectly lucid. These cases resemble somewhat others elsewhere described in this Journal⁵ in their etiology. Grille⁶ considers the subject of moral insanity, but does not add any thing new to the subject, or place it in any clearer light. Of Bini's⁷ article much may be said. Were these two articles written in the United States many of the hypercritical Italians would sneer at the primitive ideas of the United States. Moral insanity is now, fortunately, on a pretty firmly

¹ *Boston Medical and Surgical Journal*, Feb. 24, 1881.

² *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 6.

³ *New York Medical Gazette*, May 15 and 29, 1880.

⁴ *Berliner Klinische Wochenschrift*, No. 8, 1881.

⁵ JOURNAL OF MENTAL AND NERVOUS DISEASE, Oct., 1880.

Archivio per la Malattie Nervose, vi, 1881.

⁷ *Ibid.*, May, 1881.

established basis, and such efforts as those of the two authors last quoted can scarcely add much to the subject. The influence of certain social conditions in the production of insanity appears to have attracted much attention. Recently Lochner¹ has been studying the influence of military campaigns on the production of insanity. Thirty-three cases came under his observation during the period between, and inclusive of, 1870 to 1878. Of these, ten were cases of melancholia, eight cases of mania, nine secondary dementia, and six progressive paresis. Of these, fourteen were discharged recovered, two improved, five died, and ten still remain under treatment. Of those who recovered one had been less than a month ill, six between one and three months, four between three and six months, and three between six and twelve months. Of the five who died one was a case of melancholia, two of secondary dementia, and two of progressive paresis. The first case presented, on the autopsy, pulmonary gangrene and chronic leptomeningitis. The two demented exhibited evidences of pulmonary tuberculosis and cerebral atrophy. The two paretics exhibited pachymeningitis hæmorrhagica and chronic peri-encephalitis. Bartels² takes up the subject of psychoses from lead-poisoning, but he has been elsewhere quoted in the present number. The article contains a very fair *résumé* of the literature of the subject. His general conclusions are correct.

Schmidt³ makes a very interesting contribution to the puerperal psychoses. He cites from Lübben, Fürstner, and Ripping the following figures. Lübben found that fifteen and three tenths per cent. of the insanity of his female patients was of the puerperal variety. Fürstner gave a higher percentage, about sixteen and eight tenths; while Ripping's percentage greatly exceeded either, reaching twenty-one and six tenths. Schmidt found that of the fifteen hundred and twenty female insane coming under his observation the insanity of two hundred and sixty-four, or seventeen and three tenths per cent., was due to the puerperal condition. The percentage given by him is nearly equal to the average percentage given by Ripping, Fürstner, and Lübben. Of the two hundred and sixty-four, forty-seven arose during pregnancy, one hundred and thirty during the lying-in period, and eighty-seven during the period of lactation. Schmidt finds that the greatest number of cases of puerperal insanity occur between

¹ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 1.

² *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 1.

³ *Archiv für Psychiatrie*, Band xi, Heft 1.

the ages of twenty-six and thirty-five ; the least between fifty and fifty-five, and between fifteen and twenty. The greatest number of cases of puerperal insanity during pregnancy occurred between twenty-six and thirty-five ; during the lying-in period, between thirty and thirty-five, which is still more markedly true of the period of lactation. Schmidt finds rather absurdly that twenty cases of chronic mania, fourteen dementia, six progressive paresis, and two circular insanity, were due to puerperium. This does not speak highly for Schmidt's logic. About forty-three per cent. were cases of mania, and forty-one melancholia.

Lübben, Fürstner, Ripping, and Emminghaus, of course, failed to detect paresis among this class of the insane, whereat Schmidt rather naively expresses his wonder. Krafft-Ebing and Lübben find a greater percentage of mania than the author, Ripping, Emminghaus, and Schüle a greater percentage of melancholia. What renders Schmidt's figures suspicious is the small percentage of recoveries—thirty-six per cent. This shows that Schmidt's power of observation or of analysis is somewhat deficient. He has certainly mixed up coincidence and cause in a marvelous manner. Flügge¹ reports, somewhat in detail, a case of self-mutilation in what was evidently hebephrenia, and the mutilation was due, like many such cases, to an aberrant expression of eroticism. This tendency has received but very little attention, but is one deserving some consideration.

Foville² reports a case of monomania (*primäre Verrücktheit*) with marked delusions of grandeur. The case is well described and well demarcated from progressive paresis, but an objectionable feature is found in the use of the term *omegalomania* other than as descriptive of a condition. The patient's delusions in this case were markedly systematized. Cotard³ describes a case of monomania with predominant depressing delusions. Brunet⁴ describes a case of chronic mania which developed into progressive paresis after an apoplectiform attack. Cases of this kind are by no means rare, and frequently cases of chronic mania, monomania, etc., make their exit under this type. Christian⁵ describes a case of paresis coming on in an imbecile ; it was preceded by delusions of persecution, and it is not improbable that some cause like traumatism was at the bottom of the origin of the progressive

¹ *Archiv für Psychiatrie*, Band xi, Heft 1.

² *Annales Médico-Psychologiques*, November, 1880.

³ *Ibid.*

⁴ *Annales Médico-Psychologiques*, November, 1880.

⁵ *Ibid.*, January, 1881.

paresis. Foville has reported a similar case. Bevan Lewis¹ discusses the use of the sphygmograph in progressive paresis, and finds that the percussion impulse is extremely shallow and directed obliquely upward; the shallow up-stroke ends in a convex summit. The concavity of the tidal wave looks directly downward. The dirotic wave is frequently absent, or if present, is very feebly developed. There were some variations from these obtained. Billod² reports a man who, after a violent fall on the head, became demented, which was followed by melancholia, and at length by hypochondriacal delusions, the latter appearing coincident with a slight eczema. The case is well reported, and appears to be one of those cases occurring from traumatism which are the result of insidious meningeal inflammation, and frequently end in the evolution of progressive paresis and the patient's death. The relation to the eczema was probable only a trophic one.

Lamaestre³ and Regis⁴ describe several cases of congestive mania, an affection which has received much attention in France, but relatively little in Germany, England, or the United States. Frankly speaking the affection appears to be a form of progressive paresis which temporarily yields to treatment, the patient subsequently being lost sight of. The treatment adopted by both Lamaestre and Regis has been aloes, the idea being to produce by this means a derivation which would prove beneficial to the patient.

Fürstner⁵ gives a fairly complete account of acute delirium, claiming that in it alterations of the muscles, as also convulsions, are frequent. He does not regard it as so very clearly defined an affection as Schüle and others do. His description is much more valuable than that of Ball,⁶ who draws much on his imagination, and is so little versed in psychiatry as to regard the changes found *post mortem* as primary, and not the result of fluxions produced in the course of the disease.

Jenn⁶ comes to much the same general conclusions as Fürstner. He gives an interesting casuistical description of the disease. Some of his cases strongly resemble and are evidently

¹ *Journal of Mental Science*, April, 1881.

² *Annales Médico-Psychologiques*, May, 1881.

³ *Annales Médico-Psychologiques*, March, 1881.

⁴ *Archiv für Psychiatrie*, Band x, Heft 2.

⁵ *La France Médicale*, June 12, 1880.

⁶ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 1.

imperfectly diagnosticated cases of katatonia. Schaefer¹ discusses very fully the psychoses arising from disturbances of the female sexual organs. Many of these, Schaefer points out, are due to periods of life when changes in the sexual condition are going on. At the period of puberty, for example, both hebephrenia and katatonia occur.

Binecker² discusses the subject of hebephrenia, adding little that is new to the subject, but adducing fresh reasons for considering this type of disease well established.

Kiernan³ discusses the general subject of insanity, of which he gives the following classification: Mania acute, melancholia (lypemia), acute periodical insanity, circular insanity, epileptic insanity, hebephrenia, katatonia, monomania, chronic mania with confusions, chronic mania with imbecility, progressive paresis, and senile dementia. Spitzka⁴ had before given the same classification. The monomania of this classification is not that ordinarily meant by the term, but corresponds to the monomania of Ray, the primary intellectual insanity of other authors, and the *primäre Verrücktheit* of the Germans. Kiernan defines insanity as being a morbid condition produced by disease of the brain, which perverts the mental relations of an individual to his surroundings, or to what from his birth, education, and circumstances might be anticipated to be such surroundings. Baillarger⁵ discusses a case of demonomania manifesting itself in a progressive paretic. Other than as evidence of how many psychical phenomena progressive paresis may present the case is of no importance. He also gives instances where certain cerebral and spinal diseases have produced psychic symptoms at times resembling those of progressive paresis. Locomotor ataxia is remarkable in this respect.

Foville⁶ reports an interesting case of fleeting delirium in an old hemiplegic. Cases of this kind are by no means infrequent, but pass unobserved. In a not very clear article Melendez⁷ discusses the subject of mixed delirium, adding nothing that is of value. Verga⁸ reports one case of what he calls *ruphobia*, which is a useless

¹ *Ibid.*

² *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 2.

³ *Gaillara's Medical Journal*, Nov., 1880.

⁴ *Medical Gazette*, May 15, 1880.

⁵ *Annales Médico-Psychologiques*, Jan. and May, 1881.

⁶ *Annales Médico-Psychologiques*, May, 1881.

⁷ *Revista Médico-Quirúrgica*, Buenos Ayres, May 8, 1881.

⁸ *Rivista Sperimentale de Frematris*, Tome vi.

name added to psychiatry, as Hammond has already described the same condition under the name of mysophobia.

Kirn¹ discusses the psychoses found in prisons. His etiological remarks are of no value, except as to the influence of heredity, which, of course, is strong. The types of insanity presented were, out of forty cases, seventeen of melancholia, thirteen of mania, two alcoholic insanity, three epileptics, two idiots of irritable type, one impulsive insanity, one secondary dementia, and one case of senile dementia. Aside from his classification his article is of much value.

Echeverria,² in an article on feigned epilepsy, does not add much that is of value to the subject,—in point of fact his article would lead to the impression that in a neurotic subject epilepsy would be a somewhat difficult matter to detect. None of the signs given by him are positively pathognomonic, nor are they even relatively so. The relations between epilepsy and certain psychoses are not sufficiently taken into account.

Moraudon de Monteyel³ considers *folie à deux* as presenting three great types: *folie imposée*, where a patient of greater intellect imposes his delusion on another; *folie simultanée*, where two patients brought up under the same circumstance develop similar delusions. There is a great objection to placing this with *folie à deux*. There is no relation between the delusion of the two patients, and it certainly tends to lead to confusion to apply the term *folie à deux* to this class of cases. The last division adopted by Monteyel is *folie communiquée*, where the delusions are intercommunicated by two insane individuals. Apart from the *folie simultanée* idea the article is a broad and philosophical one.

We now come to the last division of our subject,—the relation of insanity to jurisprudence.

Snell,⁴ in a valuable article on the simulation of insanity, alludes to the great difficulty in settling, at times, the exact responsibility of certain neurotic individuals who have committed crimes.

Waller⁵ discusses the responsibility of epileptics, leaning rather to the sentimental aspect of the question, holding, however, the very sound view that during a short period antecedent and subsequent to an epileptic attack, the responsibility for a criminal act

¹ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 6.

² *Journal of Insanity*, Jan., 1881.

³ *Annales Médico-Psychologiques*, Jan., 1881.

⁴ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 3.

⁵ *Zeitschrift für Psychiatrie*, Band xxxvii, Heft 3.

is very doubtful. The article, despite its sentimental tinge, is of considerable value.

Hughes,¹ in a somewhat rambling article, proclaims his belief in moral insanity,—a position on which he is certainly to be congratulated,—denounces the lawyers, forgetting that the lawyer's first duty is to his client. He objects to the "hypothetical case," which certainly in the hands of a good lawyer is the best means of eliciting truth, for medical experts will disagree on as plain a disease as progressive paresis, even after a personal examination; and this being the fact the hypothetical case does much to eliminate the personal equation. Hughes objects to the lawyers compounding several psychoses, a tendency not confined to the lawyers, but also present in many of his colleagues of the Asylum Association, and of which the *Journal of Insanity* gives a great many instances.

In connection with the subject of the pathology of insanity a wonderful specimen of literature has recently made its appearance from the pen of Deecke.² Thirty-two pages of singularly involved and incoherent English are strung out on the subject of the condition of "The Brain in Insanity," without a single literary reference. The impression conveyed to the uninitiated is naturally that the propositions advanced are the results of original labor and thought. The same writer has on a previous occasion been convicted of making short abstracts from Rindfleisch, at a salary of fifteen hundred dollars a year, paid by the State of New York for such work, and has remained true to the principle with which he opened his career as a medical writer, merely varying the programme to the extent of abstracting not from one writer but from several, and notably from the severest critic of the pretended scientific work done at Utica and Oshkosh. It is to be noticed that the writer has not been uniformly fortunate in assimilating the essence of the writings which he has dovetailed into his paper. He is under the impression (p. 3) that Ferrier's localizations refer to the white matter of the cerebrum; that "leucocythæmia, oligocythæmia, hydræmia, anhydræmia, progressive pernicious anæmia, pyæmia, and septicæmia" produce local hyperæmia, serous exudations, local inflammations, and hemorrhages in the brain (p. 6); that in delirium the temporal convolutions, in melancholiac and maniacal excitement (!) the parietal and central, and in their sequences (whatever these may be) the frontal lobe and base of the brain, are chiefly affected, etc. The following

¹ *Alienist and Neurologist*.

² *Journal of Insanity*, April, 1881.

features may be original, or are such profound misinterpretations of standard writers that these would hesitate to acknowledge them as their own. Perhaps, as in the case of the Utica crib, the original inventor will blush for the uses to which his invention has been put. Congenital mental weakness is reckoned as a "primary affection of the psychical tracts, of physical origin"; nerve fibres terminate in the gray matter "with their specific energies," which, according to every modern writer, do not exist; the Sylvian or temporal lobe is found on page 16; the gray commissures, or tracts, conduct nerve force (p. 22); and finally, in "acute primary insanity" the basal processes of nerve cells undergo "coagulation or gradual contraction," shrink down to little knobs, and the mental continuity is interrupted. Can this writer have had an intuitive perception of the actual value of his own balderdash when, on page 20 of his essay, he says: "Language may be called the image of reason, and the facts of its evolution, as presented in the various modes of human speech, are the reflex of the history of reason in the history of mankind from the loftiest revelations down to absurd developments of morbid human thought and imagination"? This last seems to be strongly suggestive of the influence of Kussmaul.

In conclusion it may be not amiss to allude to a criticism passed on American psychiatric work. In a review of Dr. Jewell's¹ article on the influence of civilization in the production of nervous and mental disorders, Signor Biffi,² in a way indicative of the fact that the asylum psychosis has not been without its victims in Italy, assumes that Dr. Jewell has said that our race has in it the elements of its own destruction, and proceeds to demolish that figment of his own creation. The doctor expressed the fear that our civilization, like other civilizations, had in it the elements of its own destruction; and that there are sufficient grounds for this cannot be denied, except by those who have passed their lives immured in institutions having but little contact with the outside world. The same gentleman totally misapprehends the object of certain propositions laid down in this Journal for January, 1880, as being the *ultima thule* of what is to be desired in asylum management in the United States. Here, unlike the Latin races, the practicable is aimed at, not an unseen ideal, but, for all that, it is doubtful if even the moderate degree of reform alluded to in the propositions quoted has been attained in Italy, despite the great

¹ JOURNAL OF NERVOUS AND MENTAL DISEASE, Jan., 1881.

² *Archivio Italiano per la Malattie Nervose*, May, 1881.

advances made under the stimulus of imported German thought. Some Italian writers are beginning to display the superciliousness of certain German writers without their ability, and it is safe to recommend to Signor Biffi that he have an understanding of what he is to criticise before making a criticism. While, as has been shown, there has not been any great recent advance in psychiatry, still there has been steady progress during the last semi-annual period.

General paralysis of the insane. By WM. JULIUS MICKLE, M.D., M.R.C.P., London, Member of the Medico-Psychological Society of Great Britain and Ireland; Member of the Clinical Society, London; Medical Superintendent, Grove Hall Asylum, London. London: H. K. Lewis, 1880.

During the past decade there has been no psychosis more studied than general paresis. Voisin has written an excellent work; Mendel, a somewhat extended one, valuable chiefly for its statistics; while perhaps one of the best is the pithy monograph of Simon. The present work is an extension of articles, by the same author, which have from time to time appeared in the *Journal of Mental Science*. The first chapter is devoted to a consideration of the various names of the disease; to its definition, its prodromata very affectingly called prodromes, the history of its discovery, and its stages. The author very properly objects to the use of the term dementia paralytica, which is such a favorite name for the disease among the Germans. The term is certainly misleading, but in choosing the term the author has not done much better. Perhaps the best term is progressive paresis. The portion of the chapter devoted to the prodromata gives a pretty extensive but not well-analyzed account of these. In his discussion of the symptoms, in the second chapter, the author divides the disease into stages, the first period preceding recognized mental alienation. That this is objectionable is shown by the fact mentioned by him, that morbid moral phenomena are often prodromata of the disease. The second period given by him is called also the *first* stage of the confirmed disease; the third period of general, or the second period of the confirmed disease; and, finally, the fourth period. It is obvious that all these periods are very artificial divisions, evidences rather of an attempt at mathematical exactness rather than the expression of true clinical features. In the discussion of the symptoms in the third chapter a fair *résumé* of the subject of epileptiform and apoplectiform attacks is given. This chapter taken together is a not well-digested summary of

the views of various authors, sandwiched among which are a few views of the author. The doctor considers that recovery is possible in a few cases of the less advanced degrees of the disease. The average given by him has been much the same as that of other authors. He has seen cases last as long as ten years, a duration which has sometimes been met with on this side of the water. Chapter five, on diagnosis, gives a good summary of the points of differential diagnosis, without adding any thing new. The discussion of the causes in the sixth chapter is not clear. The author objects, and on very good ground, to the sexual excess theory. He very properly lays great stress on mental overstrain and emotional disturbance. Taking the latter in its widest sense it may be said to be the great cause of progressive paresis. The morbid anatomy given by the author in the seventh chapter is chiefly coincidental, but not characteristic of progressive paresis. He, however, mentions the hemorrhagic condition of the stomach and intestines, which is so frequently a concomitant of the disease. The same may be said of the microscopical part of the chapter. The sections on pathological physiology contain nothing that is new, and but little that is well digested. The author says almost nothing, except in an indirect way, about trophic changes in the disease. The second part, chapters ten and eleven, chiefly consist of attempts at demarcation of varieties of progressive paresis. The histories, however, scarcely seem complete enough to justify these divisions, and the cases are by no means clearly demarcated from each other. Taking the book as a whole it cannot be said to be well digested; the author should have waited for some years before publishing it. The material he has accumulated is valuable, but with the present specimen one may well be inclined to doubt his power of analysis. For one who is able to pick out detached facts the book is of value. It bears the evidence of great haste, and as the author's powers of observation are such as have enabled him to secure much that is very valuable, it will serve as a useful supplement to that of Voisin; it is in many respects superior to that of Mendel. J. G. KIERNAN.

Processes of excitation and inhibition in the motor brain-centres. The above is the title of a paper of fundamental importance, by BUBNOFF and Prof. HEIDENHAIN, in *Pflüger's Archiv*, vol. xxvi, p. 137.

It opens to our view the nature of some hitherto unknown processes in nerve centres, and paves the way for an explanation of many cerebral disorders, such as hysteria and hypnotism.

The existence of true cortical centres has been denied on account of the possibility of an escape of the irritating electric current to the subjacent white fibres, stimulation of which gives a similar reaction as irritation of the cortical surface. But Heidenhain argues that similarity is by no means identity, and to prove the difference he attempted to record the muscular contraction produced in either case. This had been done by Frank and Pitres, but, as shown by Heidenhain, their results are not quite conclusive. Heidenhain operated on dogs under the influence of morphia, which, as is well known, does not affect all animals alike. The two extremes of its action are represented by a deep sleep on the one hand, and, on the other hand, by a state of exalted reflex irritability in which the animals, though somnolent, are startled by the slightest irritation. This state cannot be removed by further doses of morphia, but it can, in some cases, by the administration of chloral or chloroform. The former condition is accompanied by anæmia of the brain, but the state of irritability by congestion. The cortical centre of the foreleg was exposed, the leg rigidly maintained in a fixed position, and the tendon of the long common extensor of the toes attached to the graphic apparatus. The exact beginning of the muscular contraction was indicated, moreover, by an automatic electric signal. Some difficulty was experienced in selecting a proper mode of stimulation. A single induction shock does not stimulate the cortex, unless it has an undesirable intensity; while *a series* of successive shocks produces a result, even if a very feeble current is used. But in the latter case, the exact time of the stimulation cannot be determined. The authors finally selected the breaking shock of a constant current, resorting to some precautionary devices which are characterized by the same ingenuity that pervades the entire article. The strength of the current was regulated with a rheochord. It was found necessary to use unpolarizable electrodes.

Frank and Pitres arrived at the important result that the time elapsing between the stimulation and the beginning of the muscular contraction is enormously shortened by slicing off the gray surface of the cortex and stimulating the white fibres directly. Heidenhain and Bubnoff admit the correctness and importance of this experiment, since it is the decisive argument that the cortex does not merely conduct the electric current, but really originates the nervous impulse. But they deny the accuracy of the figures of the French observers, for the latter did not recognize that *the time of reaction diminishes with the intensity of the stimulation*. Heiden-

hain found that with the increase in the strength of the exciting current or the excitability of the cortex the height of the muscular contraction increases, while the time of reaction is diminished. Every stimulus leaves the cortex in a state of exalted irritability, disappearing in some seconds. Hence successive stimuli can be chosen feebler and feebler, and still be effective. Even those shocks not intense enough to produce muscular response augment the cortical excitability temporarily; hence a series of faint shocks will give a result when a single shock of that strength fails. In fact, cortical excitation of any kind is followed by heightened irritability, so that peripheral irritation producing a reflex movement leaves the corresponding cortical centre more irritable.

On removing the gray surface the time of reaction is indeed shortened, but the height of the contraction is also increased, at least when the animal is in a state of calm morphia narcosis.

But on comparing different experiments it was found, after all, that the shortening of the time is really greater than corresponds to a similar augmentation of the contraction produced by more intense cortical stimulation. Moreover, the recorded muscular course is *shorter* when due to irritation of the centrum ovale than when produced by a single shock applied to the gray surface. *The process of excitation begins later and lasts longer in the nerve cells than in the white fibres* when the latter are stimulated directly. But this is true only when the morphia narcotizes the animal. When the dog is rendered *excitable by the drug* the retardation of the time of contraction, due to overcoming the cortical inertia, is inappreciably small. In some instances, of which the conditions are not fully known, a large dose of morphia has a contrary influence. The time of contraction is immensely retarded (once up to 0.17 second), and the contraction produced by cortical stimulation prolonged into a persistent contracture. In these cases the rôle of the gray surface can be most strikingly shown, for on its removal the stimulation of the white fibres leads to a much speedier and shorter contraction. But the most conclusive proof of the importance of the cortical layer is obtained in the deepest narcosis, when the cortex is entirely inexcitable, while the usual current applied to the subjacent white fibres produces a vigorous response.

The authors introduce into the article their experience on cortical epilepsy, which is often an undesirable complication of these experiments, especially when the brain is hyperæmic. The course of the attack is usually the following: The convulsion

begins in the part the centre of which is irritated, the centre being, of course, on the other side of the brain. If it does not stop here, which it may, it spreads to the symmetrical muscles of the other side, then radiates to other parts of the original side, and finally involves the entire body. As Munk has shown, the attack can be stopped by immediate excision of the irritated centre, but not by its removal later on. This the authors corroborate, and add that by the early extirpation of some other cortical centre at the beginning of the attack, the corresponding muscular group remains exempt. In some cases they succeeded also in checking the spasm of the entire body by a speedy removal of the whole motor region of either side. In other cases this did not succeed. They infer that the change-producing epilepsy starts in the cortex, but involves later on also the subcortical ganglia. Albertoni has seen epilepsy started by irritation of the centrum ovale. This, Heidenhain confirms, but points out the important difference that in that case the spasm begins on the *same* side of the body, and not, as with cortical irritation, on the opposite half. In this case, the epilepsy is really due to irritation of the cortex of the other cerebral hemisphere, the irritation being conducted thither through the association fibres, for after bilateral extirpation of the cortex no epilepsy can be produced. The authors compare the origin of the epileptic convulsions to an increase of cortical excitability produced by excessive stimulation.

Excitability of the cortical centres can be considerably influenced by stimulation of the peripheral sensory nerves. It is sometimes increased, sometimes diminished thereby. Merely touching the pair decisively augments the excitability of the corresponding centre. In certain instances morphine causes, as above mentioned, a condition of the cerebrum in which a single stimulation is followed by contracture of the corresponding muscle. This may now be inhibited by faint peripheral electric irritation, and more strikingly so by blowing on the skin. The latter experience recalls vividly checking of the cataleptic state induced by hypnotism. A point of special interest was the observation that such contractures could be inhibited likewise by following *feebler* stimulation of the cortical centre itself, or even other parts of the cortex.

The authors, in discussing these results, explain them by assuming the occurrence of two kinds of processes in the cortical centres, viz., excitation and inhibition. The predominance of the kind of molecular change causing the one or the other accounts for the

variability of the cortical excitability. Sensory impressions, as well as direct electric stimulation of the cortex, influence both processes, augmenting, as a rule, the one feeblest at the time. Thus, the depressed excitability in morphia narcosis is exalted by peripheral irritation or successive stimulation of the cortex, while inhibitory processes are started by the same procedures when morphia has previously heightened the cortical irritability.

They point out, finally, that the continuation of these experiments promises a clue for the phenomena of hypnotism in man.

SHORTER NOTICES.

I. *MANUAL OF HISTOLOGY.* By Thomas E. Satterthwaite, M.D., in association with Drs. T. Dwight, J. Collins Warren, W. F. Whitney, Clarence J. Blake, C. H. Williams, H. C. Simes, B. F. Westbrook, E. C. Wendt, A. Mayer, R. W. Amidon, H. R. Robinson, W. R. Birdsall, D. Bryson Delavan, C. L. Dana, and W. H. Porter. W. Wood & Co., 1881.

II. *LECTURES ON THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE CHEST, THROAT, AND NASAL CAVITIES.* By E. Fletcher Ingals, A.M., M.D. W. Wood & Co., 1881.

III. *INDIGESTION AND BILIOUSNESS.* By J. Milner Fothergill, M.D. W. Wood & Co., 1881.

IV. *A PRACTICAL TREATISE ON IMPOTENCE, STERILITY, AND ALLIED DISORDERS OF THE MALE SEXUAL ORGANS.* By S. Gross, A.M., M.D. H. C. Lea's Son & Co., 1881.

V. *LECTURES ON DIGESTION.* An introduction to the clinical study of Diseases of the Digestive Organs. Twelve lectures. By Dr. C. A. Ewald. Translated by Robert Saundby, M.D. W. Wood & Co., 1881.

I. This handsome volume is intended to fill an intermediate position between the larger works like Stricker's, and the smaller guides for the microscope, designed for beginners. It is, we believe, the first American work of any scope on histology. It is well and plainly written, and deals with the subject in a commendable manner. It is of course but a compilation by men, practically familiar, however, with the subject. We cannot, however, grant the praise of absolute completeness, since many of the finer points are barely, if at all mentioned, while some important inves-

tigations are altogether omitted, like those of Ebner on bone, Kühne and his pupils on nerves, Gaule on corpuscles, and others. Yet the work as a whole gives considerable information on the subject it treats, and gives it in a practical way. The plates, not any too numerous, are sufficiently instructive for their purpose, though often useful rather than ornamental.

II. This volume of some four hundred pages differs from other works on these subjects (of which there is an abundance), only in grouping together such heterogeneous topics, as diseases of the lungs, heart, throat, and nose, and considering them only from the standpoint of diagnosis and treatment. The physical signs are given pretty fully, but often the length of the separate articles will be found to depend more on the author's verbose style than on any special thoroughness. Of course we find thrown in gratuitously, as an aid to diagnosis, the cuts of all requisite instruments, familiar to the reader of the oldest surgical-instrument catalogues. So far, so good! But when the author follows up the physical signs with the description of the treatment, without pathology, course of disease, or prognosis, we stop to wonder. But no harm is done. The hints on treatment are so brief (to wit, diphtheria, 14 lines), so dictatorial without explanation, and so unsatisfactory in general, that no reader will be tempted to place reliance on them to the exclusion of more comprehensive works.

III. Dr. Fothergill is well known as a prolific writer, whose productions deserve due attention. His present volume, some 300 pages in size, discusses indigestion and biliousness in a pleasant, chatty way, teeming with suggestions. It does not pretend to be a rigidly scientific work. It is not characterized by systematic arrangement, consecutive original research, nor are even the numerous physiological allusions to be taken in all cases without some allowance. But it is an agreeably written essay on practical, often neglected topics, showing much erudition and personal clinical experience. We have no hesitation in recommending it for its suggestiveness to any practising physician.

IV. The title of this monograph, "a practical treatise," etc., is fully justified by the nature of its contents. It is eminently practical. The author shows, on the basis of a large and evidently satisfactory experience, that routine prescriptions are out of place in these disorders, and that each case requires an individual examination. There has been but little information accessible on this topic hitherto, and this original and painstaking treatise does therefore really fill a void. It may be that the author generalizes

too broadly in attributing such importance to stricture as the cause of these disorders as he does, but this can only be decided by an experience of others similar to his. At any rate the book is a refreshing lecture in this time of compilatory book-making.

V. This is a well-written book containing a series of twelve lectures delivered to practitioners and advanced students on the physiology of digestion. It presupposes some knowledge of chemistry and physiology, but gives, in a simple and pleasing manner, the results of the latest investigations in this department of physiology. The experiments, many of which are those performed by the author, are carefully stated and the conclusions well drawn. The book is one which may be read with interest and profit, and should find its way into the library of the well-informed physician.

Editorial Department.

THE present number closes the eighth volume of this JOURNAL. It was at first projected under the belief that such a periodical could be made useful. The editors were willing to incur, and to the end have cheerfully accepted, any labor or pecuniary risk involved in its publication. Whether it has answered reasonable expectations, or has been of any service in the department of medicine the interests of which it has sought to advance, others must judge. But the editors have no reason for disappointment when they regard the numerous expressions of favor with which the JOURNAL has been received; and which have reached them from the most competent members of the profession both at home and abroad. Many of these expressions have been peculiarly gratifying.

The JOURNAL has not been of a kind to commend itself to physicians at large. It could not be devoted to promoting the scientific interests of neurological medicine, and at the same time meet the direct practical spirit of the mass of the profession. In view of the fact that the position deliberately chosen for the JOURNAL could not be popular, it was begun and has been continued as a personal enterprise in the midst of much care and under the pressure of other occupations. In justice to ourselves we may be permitted to refer, in a general way, to the difficulties which we have had to encounter, as excuses for the numerous literary and other blemishes which have marred its pages in spite of such care in its make-up as we were able to exercise. Those persons

only who have had practical experience in such matters can justly estimate a situation in which so much labor has been performed by the editors in conducting the JOURNAL.

It may not be amiss at this time to state in a few words the share in the work which has been taken by the active editors respectively.

The periscope department, containing extracts from foreign and home periodicals, and which has been so often commended by our readers, has been almost wholly made up by Dr. Bannister. In the department of reviews, the majority of lengthy book notices have been prepared by Dr. Jewell, who has also written the larger portion of editorial matter. In other respects contributions from either of the editors have been signed with their names.

The editors desire to express their deep sense of obligation to the gentlemen who have kindly lent the influence of their names as associate editors to give the JOURNAL the stamp of authority in the higher walks of the profession. They wish at the same time to express their obligations in no formal manner to the gentlemen who have in every way (especially by their contributions) aided the JOURNAL. They would particularly mention the names of Drs. Hammond, Spitzka, Beard, Kiernan, Ott, and Mason among the many who have freely given of the choicest results of their labors.

Since the first year of its existence the JOURNAL has been the exclusive property of Dr. Jewell. During the past year impaired general health and the pressure of other obligations on his part had led to the determination to transfer the JOURNAL. That determination is now carried into effect. In laying aside a pleasant responsibility voluntarily assumed, the editors wish finally to express their grateful acknowledgment to their subscribers and to all friends of the JOURNAL, wherever they may be, for the interest they have manifested in its welfare.

The JOURNAL has been delayed in its appearance for a month, chiefly with the hope of presenting to our readers the prize essay of Dr. E. C. Spitzka on the *Somatic Etiology of Insanity*, with which to close the present volume. But in this hope we have been dis-

appointed. The above statement is made that our readers may know why the present issue has been so long delayed.

The JOURNAL has now been transferred to Dr. William J. Morton, of New York City, who is both proprietor and editor-in-chief, and who has secured the coöperation, as associate editors, of several of our first neurologists, whose names appear in the accompanying prospectus for the new year.

We would heartily commend the new management to our subscribers and friends everywhere.

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

THE PHYSIOLOGY OF THE HEART is enriched by a very methodic paper, by Ludwig and Luchsinger, in *Pflüger's Archiv* (vol. 25, p. 211). They began by studying the influence of temperature upon the heart. Contrary to the experience of some previous observers in mammals, they found that in the frog decided lowering of the temperature destroyed the action of the vagus nerve, while extreme warmth increased its irritability. Since the temperature is known to influence also the motor ganglia of the heart, the authors propose the following view: The effect of stimulation of the vagus depends not only upon the irritability of that nerve, but also inversely upon the excitability of the motor ganglia. Vigorous activity of the latter is less easily inhibited than feeble action. Cold enfeebles both vagus and motor ganglia, but the former most. As the temperature increases beyond a mean, the irritability of the motor ganglia rises above that of the inhibitory apparatus, hence the weak action of the vagus observed by previous authors under these circumstances. But as the temperature approaches the limit compatible with life the motor ganglia fail first, hence the superiority of the inhibitory fibres. In fact, this same increase of vagus action just prior to failure of the heart, can be witnessed in natural death as well as in various forms of narcotic poisoning.

Further experiments were made on the bloodless heart. Blood was expelled by a current of normal salt solution or neutral almond oil. After some minutes or hours, sooner with oil than with salt water, the pulsations cease in the ventricle, auricle, and, lastly, venous sinus.

Blood or serum restores the irritability at once.

In these experiments the effect of vagus irritation persisted as long as the heart continued to beat ; the feebleness even the pulsation the more easily could it be checked by vagus stimulation.

The effect of the intracardiac pressure upon the rhythm was studied by sending a current of salt solution through the bloodless heart under variable pressure. It was found without exception that the frequency rose with the pressure at first in a direct proportion, subsequently more slowly.

The same dependence of the activity on the tension was even more strikingly illustrated on the lower half of the ventricle, which contained no nerve cells. Ordinarily quiescent, when filled with a salt solution the apex will beat only when the pressure is increased, and the frequency will rise with the tension. The greater the stimulation of the motor ganglia by the augmented tension the less manifest is the action of the vagus when irritated, because in the struggle between inhibitory and motor ganglia the more active side must win. If in such experiments the auricle yields more readily to the influence of the vagus than the ventricle, it is due to the fact that the thinner auricular musculature is nearly overcome by the greater work imposed upon it by the high pressure, which the thicker ventricular walls can yet accomplish. Occasionally some anomalous results were observed ; for instance, a relative insufficiency of the vagus even after the pressure had been reduced. This is referred to a long persistence of the stimulant effect of the previous pressure upon the motor ganglia, and not to paralysis of the vagus. For in other instances the vagus regained its superiority after a pressure equal to 40 cm. of water had distended the heart for some time. The authors explain this by failure of the motor ganglia from over-stimulation. Occasionally they even saw an accelerating influence of the vagus upon a heart in a state of contracture, for which they give a somewhat forced explanation.

The experiments of Merunowicz have shown that the apex of the heart is capable of pulsating under the influence of some irrigating fluids like defibrinated blood. This is not due to the tension alone, for the beats continue even at a pressure of zero. The action of different fluids was examined in this respect. First of all the temperature was investigated and, as was anticipated, it was found that with increasing temperature the apex became more irritable.

The author's experiments with different irrigating fluids seem hardly numerous or varied enough, but, on the whole, confirm the

conclusion previously arrived at by Merunowicz, that the higher percentage of blood in the irrigating fluid increases the irritability of the muscle, while a lower proportion favors the muscular discharges.

THE FUNCTIONS OF THE CEREBRAL CORTEX.—We translate the following abstract by Sigmund Exner of J. Munk's recent memoir on the functions of the brain, from the *Biologische Centralblatt*, No. 1, April 15, of this year.

The book before us contains six lectures delivered from 1877 to 1880 before the Physiological Society and one before the Academy of Sciences, of Berlin. The earliest publication is a historical introduction, together with a series of critical remarks, with also important suggestions for the experimenter. It may be well to use this opportunity to give a comprehensive abstract of the author's experimental results, although they do not altogether belong to the most recent times.

In opposition to the view of Gall, chiefly by reason of the experiments of Flourens and Longet, the idea of the unity of the cortex of the brain as the organ of the mental functions had become established with physiologists. Nevertheless, clinical observation had afforded the proof that certain mental activities were associated with the integrity of limited localities of the brain (speech centre), and anatomical investigations had rendered it probable that sensory and motor functions were associated with different portions of the cerebrum. Fritsch and Hitzig showed in 1870 that electric excitation of limited tracts of the cortex produced movements in definite muscular groups on the opposite side of the body, and that definite muscle groups belonged functionally to definite regions of the cortex. For the purpose of demonstrating localized centres for the separate sensory functions, Munk has the especial credit of having made numerous and careful investigations in dogs and monkeys.

In the dog the larger portion of the occipital lobe has the function of a "visual sphere"; that is, in it occur the central changes on which the function of sight depends. It is the ultimate distinction of the optic fibres, according to the following arrangement. The greater part of the left retina is in connection with the right visual sphere; only the most lateral portion, not over a quarter of the whole retina, measured horizontally, is in connection with the visual sphere of the same side. That of the right eye is correspondingly connected with the left side of the brain. The distribution of the fibres is so arranged that the ret-

inal and the cortical terminations in the opposite hemisphere are inverted, so that what is on the right in the retina is on the left in the cortex, and what is above in the former is below in the latter. Extirpation of any one portion of the cortical visual tract renders the corresponding part of the retina insensible ; extirpation of one "visual sphere" blinds the eye on the opposite side, except its outermost part ; extirpation of both cortical visual tracts causes complete and permanent blindness. In each visual tract is a central portion, characterized by the peculiarity that its extirpation produces a loss of visual memory in the opposite eye ; that is, the dog still sees, but does not recognize its food, etc., any more. This visual appreciation may later become restored. The author distinguishes between this kind of visual loss and ordinary loss of sight from injury to the cortex, and calls the former psychic blindness (*Seelenblindheit*) and the latter cortical blindness (*Rindenblindheit*). This spot, destruction of which causes psychic blindness, contains also the central terminations for those parts of the retina for the fixation of vision—corresponding to the fovea centralis in men. In the temporal lobe is situated the auditory cortical tract. This also contains a special spot, extirpation of which causes psychic deafness ; that is, the dog still hears, he pricks up his ears at a sound, but he no longer comprehends what it means.

The touch sense has also its region in the cortex, and indeed this "sensory sphere" involves nearly the whole of the convexity that is not occupied by the visual and auditory tracts. In this can be still further distinguished the subdivisions corresponding to different parts of the body, especially those for the anterior and posterior limbs, the head, an eye, ear, neck, and back regions. All these lie in the anterior half of the cortex, and show an arrangement that makes a relation between the results of our author and those of Hitzig appear certain.

In his experiments on monkeys Munk obtained results corresponding to those obtained in experimenting with dogs.

MECHANICAL EXCITATION OF THE NERVES.—K. Hallsten, *Nordiskt Med. Arkiv*, Trettonde Baudet, Första Häftet, 1881, No. 6, describes some physiological investigations on the excitation of nerves by the use of a new method. He so arranged a Marey's tambour that the lever should strike against the nerve

when the membrane was put in vibration. This tambour was connected in the usual way by an india-rubber tube with another similar one, upon which an ivory ball fell from a determined height. The intensity of the excitation of the nerve was modified by the jointed lever, which is supplied with the more modern models of Marey's apparatus. To excite the different parts of the same nerve, the tripod which supports the tambour travels along the table of the myographion.

The author examined by the graphic method the mode of movement of the lever, and found that in each experiment the lever strikes twice against the nerve, and that the last shock occupied a considerable space of time, but did not exert as profound an influence from above downward as the first.

The researches were directed to the modifications of irritability caused by a transverse section, and also the irritability of different portions of the same nerve. As regards the first of these, Hallsten has found that the changes in the irritability produced by a transverse cut may also be demonstrated by mechanical excitation. Concerning the irritability of different parts of the same nerve, his experiments show that it reaches its maximum a little below the point where the nerve trunk leaves the plexus, and diminishes on each side of this maximum point; the irritability is less, on the other hand, below the point where the femoral branch leaves, and from there it increases in both directions.

Finally, he shows also that even with mechanical excitation, an irritant that is about at its minimum produces a muscular contraction in a great range of the charge, and that these contractions diminish with the charge.

As to the determination of the exact degree of the minimum excitant, there exists, according to M. Hallsten, no difficulty in determining by his method the limits between which it is to be found; nevertheless he considers all determinations of this kind as illusory so long as these so-called limits for the calculation of the minimum excitant cannot be expressed in figures.

THE GANGLIA OF THE URINARY PASSAGES OF MAN AND CERTAIN ANIMALS.—The following are the conclusions of a recent memoir by Prof. Rudolf Maier, of Freiburg, published in *Virchow's Archiv*, lxxxv, 1 Hft., July, 1881.

1. Upon all portions of the walls of the urinary passages ex-

ternal to the kidneys, in man and certain other animals, are ganglia giving out nerve branches, and in the mucous as well as in the muscular layer.

2. In the mucous membrane they are situated either in its whole thickness or preferably or exclusively in that portion of it adjoining the muscular coats.

3. In the muscular coat itself the nerves form larger anastomoses between the coarser muscle bundles and smaller ones between the finer bundles of this greater layer. Both contain ganglia, the first the greater number.

4. The nervous plexuses in the muscular and mucous coats are in continuous connection with each other.

5. The nerve plexuses do not form a continuous closed network over the vessels, but more commonly form, by frequent anastomoses, connections between the more superficial and deeper layers.

6. The ganglia are situated :

a. On the nerve branches, and so arranged that the perineurium passes over them only on one side, while on the other the cell groups are margined directly by nerve fibres.

b. They lie, not closely associated with the nerve fibre, in rounded or spindle-shape masses, but in larger masses and more like a bunch of grapes on a stem, surrounded by connective tissue.

c. The ganglia lie in the middle of a nerve branch, and push the fibres apart from each other.

d. They are situated at the points of bifurcation of the nerve branches.

e. The ganglia lie embedded in the course of a single nerve fibre.

7. The ganglion cells, where they occur in large numbers together, are enclosed in a meshwork of perineurium.

8. Where they occur singly they are altogether or partly surrounded by a simple sheath of perineurium, or are naked ; they are enclosed in neurilemma when they appear within nerve fibres.

9. Part of the ganglion cells appear to be apolar, others are unipolar, and some again bipolar.

10. The processes divide themselves into true, that is, actual continuity of the protoplasm into a nerve fibre, and false, or extensions of the ganglionic sheath into the connective-tissue sheath of the nerves.

11. The ganglion-bearing nerve plexuses consist, for the most part, of pale fibres.

THE NATURE OF VOLUNTARY MUSCULAR CONTRACTIONS.—Prof. Christian Löven, in a paper read at the Scandinavian Naturalists' Congress, 1880, and published in the *Nordiskt Med. Arkiv*, xiii, 1, No. 5, 1881, after having noticed the fact that the very numerous investigations on the functions and properties of nerves and muscles have yet left only too much to be desired in the way of explanation of the most common phenomena manifested in the living healthy organism, and especially of those relative to voluntary tonic contractions, reviewed the various opinions on this subject, and distinguished three, essentially differing from each other, viz. :

1. That which holds that these contractions are truly continuous, *i. e.*, engendered by a continuous excitation of the nervous centres.

2. The opinion admitting that the central apparatus, and, first of all, those of the spinal cord, can only transmit their excitations to the muscles by separate discharges, following in this a definite rhythm for each species of animal (in many, according to Helmholtz, this would be 18-20 per second, in the frog 16-18 per second).

3. And last, that of M. Brücke, holding that the apparent continuity of the tonic contraction is due to the fact that the discharges are not perfectly isochronous in all the nerve fibres supplying a muscle, but resemble rather "volley firing."

Decisive proofs of all these views are lacking. The first is based upon the generally admitted fact, that voluntary contraction, as well as strychnine tetanus, never produces "secondary" or induced tetanus in the paw of the galvanoscopic frog, the nerve of which has been applied to the contracted muscle. The second, which may be considered the predominant one at the present time, supports itself by the analogy with artificial tetanus, and especially by the muscular sound. The third view, finally, has scarcely any other thing in its favor than the desire to show the difficulty presented by the absence of induced tetanus.

Thanks to the extreme sensitiveness of a capillary electrometer the author was able to show in 1879 (*Nordiskt Med. Arkiv*, xi, No. 14) that the voluntary tonic contractions in the toad, also strychnine tetanus in that animal as well as in the frog, are accompanied with well-marked and regular rhythmic electric variations. But the number of these variations being only about eight per second (instead of 16-18 according to the reigning opinion), it becomes very difficult to explain to one's self how in volun-

tary contractions and strychnine tetanus muscular jerks so widely separated in point of time could so fuse themselves as to form an apparently continuous contraction, especially when we consider that ordinarily as many as 20 excitations, and even more per second, are needed to cause a perfect electric tetanus.

The author thinks that the simplest method of obtaining a solution of this difficulty would be to admit that the physiological excitations sent to the muscles from the motor centres differ in some essential property from those we give to the motor nerves in laboratory experiments, and notably differ in the fact that they are slower. In fact, these oscillations provoked in the capillary electrometer by voluntary and strychnic contractions appeared to M. Löven to possess this property, though naturally the difficulty of reaching perfect certainty in this regard ought to be very great. Furthermore, amongst the whole of the facts obtained by experimental excitation of the motor nerves, we find some that show, as far as we can judge by the form of the muscular curve, that the character, or, if we choose, the form of the motor excitations is not always the same. It suffices to recall the slow contractions that appear when a part of the nerve by which the excitation should pass, is chilled, and also the contractions which, in certain cases, are provoked by the opening of a continuous current.

If the physiological excitations are distinguished by their slowness, the inability of a voluntary contraction to produce an induced contraction ought not to be so difficult to comprehend, seeing that it is necessary, in order to excite the nerve of the galvanoscopic paw, that the electric variations in the "inductor" muscle should have not only a sufficient intensity but a certain celerity; and therefore the fusion of these slow contractions into a continuous tetanus ought not to appear strange, even if the number of the muscular jerks per second does not exceed the eight oscillations above mentioned.

The study, by the aid of the electrometer, of the electric variations that accompany voluntary and strychnic contractions reveals still other peculiarities that appear to M. Löven to be of capital importance, especially for the explanation of certain pathological conditions of the motor functions. These oscillations vary, not only in their rhythm, and that in direct proportion to the energy of the contractions, but also, as the author thinks, very notably in quickness, being sometimes slower, sometimes faster.

M. Löven thinks that these differences can hardly have any

other cause than a regulator action already exerted in the nerve centres. It would evidently be very difficult and altogether unprofitable, in the present state of our knowledge, to try to formulate hypotheses in regard to the organs that may exercise this function, or as to their probable mode of action; but the cases where this regulating influence is lacking are very easily recognized.

One of these cases presents special points of interest, inasmuch as it still belongs to the physiological domain; it is the tremor that is seen in strongly contracted muscles when we seek to overcome a resistance by the greatest possible effort. In order to see if the oscillations of such a tremor follow any constant rhythm, Löven registered graphically by a very simple procedure the oscillations that occur in the muscles of the arm when an attempt is made to flex a very resistant bar of steel, and he found that in a number of healthy persons the rhythm of these oscillations was very regular at 12-13 per second.

He thinks that we may admit, without too much assumption, that these oscillations are, in fact, nothing else than the expression of the simple muscular contractions, which in an excessive effort of the motor centres cannot be sufficiently blended to produce a perfect continuous tetanus.

At the end of his paper M. Löven called attention to various applications that could be made of these views in the explanation of certain characteristic phenomena of some pathological conditions of the motor system.

VASO-MOTORS OF THE LYMPHATICS.—MM. Paul Bert and Laffont have, by opening the abdomen of an animal in the full process of digestion under warm water, discovered the vaso-motor nerves of the lymphatics. In this operation, the chyloferous vessels appear as white cords, and nodosities are formed along them by excitation of the solar plexus or the great splanchnic nerve. Their experiments were reported to the Société de Biologie, April 2, of this year.

ORIGIN OF THE CRANIAL NERVES.—Duval (*Progrès Médical*, Nos. 15 and 16, 1881), before the Paris Biological Society, read a paper on the subject of the cranial nerves originating as spinal nerves with intumescences, in which he dealt more especially with the olfactory and fifth pair. The ganglion of Gasser is

easily recognizable as an intervertebral ganglion, and Duval is evidently unacquainted with the lengthy paper read at the last Boston meeting of the American Association for the Advancement of Science, August 28, 1880, by Dr. S. V. Clevenger, of Chicago, who not only brought the intervertebral homology to bear upon all the cranial nerves, but insisted that the cerebrum, olivary body, mammillary eminence, and tubercular quadrigemina were originally swellings upon the roots of posterior sensory nerves, and that the cerebellum was formed from a great number of fused hypertrophied intervertebral ganglia (JOURNAL OF NERVOUS AND MENTAL DISEASE, October, 1880). The tendency of French and German journals to ignore American scientific work is not a little remarkable.—*Chicago Med. Review*, June 5.

INFLUENCE OF SECTION OF THE TRIGEMINUS ON THE EYE.
—At the session of the Soc. de Biologie. Apr. 2 (rep. in *Le Progrès Médical*), M. Poncet (of Cluny) communicated the result of some investigations on the effects of section of the trigeminus upon the eye. After having shown that physiologists disagree to a considerable extent in the acceptance of the traumatic theory of the consecutive corneal ulcer, he showed the part that the discoveries of Franck, and Dastre and Morat should play in the pathology of the trigeminus; the former having demonstrated the action of a special sympathetic filament, and the latter authors having proved the vaso-dilating action of the sympathetic on the labial mucous membrane. M. Poncet has been able to determine, with M. Dastre, that vaso-dilatation by excitation of the great sympathetic extends to the veins of the retina.

In the eyes of a rabbit, after section of the trigeminus performed by M. Laborde himself, and dating back 8, 15, and 30 days, and one year, he found the following conditions: 1. As regards the corneal nerves, the degeneration of which has been so well described by M. Ranvier, he also found, after a year, the complete regeneration of the corneal plexus, in a manner altogether unlike the normal type. In the middle of the inextricable nervous maze, are found nerve sheaths in which the old tubes have not been regenerated. 2. The keratitis which may accompany an exudation into the interior chamber affects especially the superficial layers of the cornea. Neither iritis, nor suppuration of the process, nor posterior choroiditis, nor humoral disorder, nor migration of pigment in the retina, nor detachment of that membrane, were ob-

served, but the most internal layers of the retina are the seat of an œdema, characterized either by the presence of œdematous masses between the optic fibres, or by hypertrophic degenerations of the ganglion cells; finally, by the increase of the protoplasm of the internal granules. These alterations differ essentially from those described by the author in a previous memoir, as following optico-ciliary section.

DEVELOPMENT OF THE CRANIAL NERVES.—M. Mathias Duval reported to the Société de Biologie, April 2 (abstr. in *Le Progrès Médical*), that he had recently had an opportunity to examine the brain of a lamb fœtus at term, which was subject to an arrest of development. It was an *otocephale*; the head, reduced to the middle and inner ears, appeared to have been severed by a ligature above the basilar process. In a section of the encephalic stump, at the level of the floor of the fourth ventricle, he recognized the nucleus of origin, the eminentia teres, and the exit of the facial nerve, as well as the origin of the external motor oculi. The nucleus of origin of the trigeminus, situated in the same plane, and the section of which, in the form of a horseshoe, is commonly easy to recognize, was absolutely invisible. What is the explanation of this phenomenon? M. Duval finds it in the study of the development of the spinal roots.

We are aware, in fact, that in the embryo, before the closure of the spinal canal, we observe rising from its anterior portion two prolongations, the origins of the anterior roots. Later, when the canal is closed, we see leaving its posterior region two lateral prolongations composed of nervoso-epithelial colonies. These diverticula become the spinal ganglia, but they first become pediculated, then they separate themselves completely from the medullary canal, and it is only still later that it sends toward the cord on one side and toward the periphery on the other the prolongations that form the sensory nerve roots.

Thus, as regards the trigeminus, the medullary portion should start from the ganglia of Gasser, thus explaining why no trace of it was found in the medulla.

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND, AND PATHOLOGICAL ANATOMY.

DISORDERS OF THE BRAIN IN DYSPEPSIA.—At the session of the

Soc. de Biologie, May 21 (rep. in *Le Progrès Médical*, No. 22), M. Leven made a communication on the brain troubles in dyspepsia. He had a hundred observations that demonstrated to him the existence in dyspepsia of cerebral symptoms not, so far, noticed, for example, cerebral commotion. He had seen patients struck suddenly in the street with veritable apoplectic attacks, lasting ten minutes or a quarter of an hour; they were supposed to be epileptics, but were in reality only dyspeptics, in whom the cerebral accidents subsided completely as soon as the digestive functions were reëstablished. In the dyspeptics the intelligence remains intact; there is never any mental alienation; certain cerebral faculties may be altered or obscured, so to speak, but the Ego remains entire, and the patient controls himself in his disorder. The disorder of the higher mental faculties, the enfeeblement of the will, of the activity, of the memory, of the power of speech, are easily observed. Some patients are incapable of determination; they need an effort to perform even ordinarily instinctive actions, such as to recover an object they have accidentally dropped; in them the memory is defective and speech difficult, especially after eating. A general sadness overcomes them, every thing appears dark; but, unlike the subjects of hysteria, they generally present a cutaneous hyperæsthesia, but never anæsthesia.

In the discussion of M. Leven's communication M. Laborde took some exceptions to its conclusions. Certainly he did not deny the influence of disorders of the stomach upon the brain, and no one cares to discredit the symptoms of anæmia of dyspeptic origin; but it may be that M. Leven had made a slightly forced interpretation of his results.

There are many persons in whom the digestive disorder is dependent upon nervous disease, and it is straining a point somewhat to seek to find in the stomach the point of departure of all the phenomena. He had had under his care a dyspeptic woman, who had simultaneously delirious ideas of fear of being bitten by a mad dog, which soon increased to the dread of contact with any one who had touched a dog; finally it extended to fear of contamination by aliments, and at last the patient became almost entirely insane.

M. Leven said, in reply, that that case was simply one of insanity, while he spoke only of hypochondriacs, who, however they are spoken of by alienists and others who have so far studied them so ill, are not demented; they possess their intelligence and ought not to be ranked with lunatics.

M. Laborde asked, then, what proof could be given that certain hypochondriacs were not insane. That a well-directed dietary course might improve them is possible, but that is no reason for saying that the stomach is the point of departure for all the symptoms. 'It is necessary to observe a patient a long time to see a mental affection, partial in its beginning, degenerate into dementia.

HYDROPHOBIA AND SEPTICÆMIA.—At the session of the Acad. de Médecine, May 24th (reported in *Le Progrès Médical*) M. Colin (of Alfort) read a paper entitled : Some Experiments on Hydrophobia, Septicæmia, and Charbon. After a preamble noticing the experiments of MM. Raynaud, Lannelongue, and Pasteur, who had claimed to have found a new disease produced by inoculating rabbits with the saliva taken from the mouth of a child dead with rabies, and with whose views he did not agree, he stated his own experiments. He collected on a lancet a certain quantity of virus from the mouth of a rabid living dog, and successively inoculated three rabbits. The first received one puncture with the lancet, the second received two, and the third three. The rabbits exhibited no noteworthy symptoms till the eighteenth day, when they began to drag the foot in which the puncture had been made, and six hours later they fell over on one side. The same evening the rabbit that received a single inoculation succumbed, the second was in agony, and the third had no abnormal symptoms.

All three finally died ; the first eighteen days after the inoculation, the second nineteen, and the third twenty-two days after the punctures were made. The symptoms of the disease were vague, and consisted, in the later stages, in an extreme depression and a stiffness of limbs together with tetanic convulsions. The respiratory movements were much diminished and attained only one third the normal frequency. In short the salient phenomena of rabies were altogether lacking. The autopsy revealed the following lesions : on the right flank, where the inoculations were made, absence of œdema, or of pus or plastic deposits ; in the lymphatics, which were much tumefied and smooth, the presence of voluminous white globules, and the complete absence of vibriones and bacilli ; and in the skin, nothing indicating any lesion whatever.

These lesions show without question that we have to do here with septicæmia, or purulent infection, and M. Colin declares that these animals have succumbed to hydrophobia.

ALTERATIONS OF THE NERVES IN CHRONIC RHEUMATISM.—

At the session of the Soc. de Biologie, April 2d (rep. in *Le Progrès Médical*), MM. Leloir and Dejerine stated that they had found in a case of muscular rheumatism with considerable muscular atrophy and rapid eschars, the nerves adjacent to the eschars affected with atrophic parenchymatous neuritis. They are of the opinion that the nervous alteration was antecedent to the eschar, and see the proof of this in the rapidity of the alteration of the tissues.

THE ETIOLOGY OF LEPROSY.—Dr. Albert Neisser, of Leipzig, concludes a paper on the etiology of leprosy in *Virchow's Archiv*, lxxxiv, 3 Heft, June, containing the results of careful microscopic investigation of the disease, with the following :

From all the above-described points follow, for leprosy, these hypotheses.

1. Leprosy is a true bacteria disease produced by a specific bacillus form. For this hypothesis speak the following : the constancy of the unquestionable microscopic findings ; the peculiar constitution of these bacilli ; their presence in abundance corresponding to the disease, and in all affected organs ; the proof that the specific peculiarities of the leprosy cells can also be experimentally produced by invasion of the bacilli.

2. These bacilli occur as such, or more probably as spores in the organism, and remain in incubation, varying in length according to circumstances, in depositories, possibly in the lymph glands. The duration of this incubation varies, like the cases of leprosy themselves, to a remarkable degree, especially in comparison with other infectious diseases. The physiological resistance of the human organism is also sometimes as great as the energy of growth of these bacilli is slight. Both the incubation and the course of the disorder appear to be more rapid in the tropical than in the European regions where leprosy abounds.

3. From the depositories the invasion of the system takes place and especially,

- (a) Into the skin (leprosy tuberculosa) as in variola, syphilis, etc. In this, special regions, which are otherwise particularly exposed to external injurious influences, such as the face, hand, elbow, knee, are points of selection for its attacks.

- (b) Into the peripheral nerves (leprosy anæsthetica). The muscular phenomena and also the trophic disorders correspond to the known symptoms in other disorders of the peripheral nerves.

(c) The other organs, testicles, spleen, cornea, cartilage, liver, are less involved.

4. Through the bacilli, or spores, inflammation is produced in the vascular organs, or by their migration inward from the periphery in case blood-vessels are lacking. These lymph cells (and fixed cells) form, then, the material for the leprous new formation. By the specific action of the bacilli the wandering cells become lepra cells, characterized by their peculiarities of form, course, and changes.

5. With these preliminary propositions we can assert the probability that lepra is an infectious disease, and, in its specific products, contagious. These are tubercle cells, tissue juice, and pus, with living bacilli or spores. Not every sample of pus is infectious, on the other hand, in the subject of leprosy, since they may contain no bacilli, no more than the contents of the pemphigus bullæ.

The disorder can not only be directly contagious, but may be transmitted indirectly by external means, if by these latter the bacilli or spores are transported. It has been already pointed out that in lepra, more than other bacteria disorders, the individual sensitiveness to infection is of influence.

On the contrary, lepra, in my opinion, is not transmissible by inheritance.

I close, for the present, with these remarks, but hope soon to follow them with a clinical memoir, especially upon the morbid nervous phenomena of the disorder.

EPILEPSY.—At the late session of the International Medical Congress at London (rep. in *N. Y. Med. Record*), epilepsy was the subject of a demonstration by Dr. Laségue, who described true epilepsy as being due to malformation of the skull, either idiopathic or traumatic, all other forms as being spurious or epileptoid, *i. e.*, those due to cerebral traumatism, organic lesion, and toxic or hysteric conditions. The true epilepsy (excluding the traumatic), dependent on malformation of the skull, follows only on its ossification, and invariably develops between the age of fourteen and eighteen years. The head is found on examination and measurement to be asymmetrical, either laterally or antero-posteriorly, and this is accompanied by asymmetry of the face, the mouth especially being askew (*strabismus buccalis*). This form is never hereditary, nor is it transmissible to offspring. The first

attack of epilepsy is identical in character with all succeeding attacks, therein differing markedly from the epileptoid forms. The attacks of epilepsy occur between 4 and 7 A. M., during the passage from the sleeping to the waking state. These patients are epileptics in every thing. Dr. Motet stated that Dr. Laségue's views were generally accepted in Paris, but no discussion in confirmation or opposition followed.

LOCAL ASPHYXIA OF THE EXTREMITIES.—Dr. Momsen, of the French Marine, *Arch. de Méd. Nervale*, xxxiii, 340 and 431 (abstr. in *L'Union Médicale*, July 21). As a result of chronic miasmatic infection there are sometimes observed nervous syndromes not without analogy to those following the processes of diphtheritic intoxication. In the original observation and those selected from other quarters, that are discussed in this memoir, the patients were affected with local asphyxia of the members, or rather with nervous disorders analogous to the vascular spasms of the limbs, and, further, with regular intermittent symptoms preceded or followed by local asphyxia or alternating with it. In some the local asphyxia appeared with the febrile symptoms, forming genuine attacks, followed by the epiphenomenon of painful tumefaction of the extremities, that is, by a paralysis of the vaso-motors. This local asphyxia appeared not only after the attack of intermittent fever, but it also follows the malarial diarrhoea of Cochin China.

It follows, therefore, from the twenty-two cases cited in this paper, that local asphyxia is related etiologically with intermittent fever, which it may replace, and that these nervous accidents are comparable to the larvated manifestations of malaria.

The symptoms may be classed methodically; in fact they appear: 1. *In the nerves arising in the medulla* (epileptiform and hysterical symptoms); 2. *in the organs innervated by the pneumogastriks with or without association with the sympathetic* (pulmonary accidents, congestions, pneumonias, etc., gastro-intestinal accidents, vomiting, epigastralgia, intestinal congestions, cardiac accidents, irregularity of the cardiac pulsations, angina pectoris, etc.); 3. *in the sympathetic* (ocular disorders, amblyopia, congestion, flow of tears, secretory disorders, diabetes, polyuria, icterus); 4. *in the peripheral vaso-motor, sensory, or motor nerves* (herpes, urticaria, pemphigus, asphyxia of the mammæ, flushing, local chills, muscular atrophy, growth of adipose or epidemic tissue, anæsthesia, hyperæsthesia, temporary paresis, tremors).

These phenomena can be explained up to a certain point by the theory which considers local asphyxia of the extremities as a neurosis, by the exaggeration of the excito-motor power of the cord holding under its dependence the vascular innervation. It is, perhaps, not impossible to explain the miasmatic origin of these phenomena, by an irritation of the vessels of the cord due to melanæmic deposits. This irritation would give rise to spasms of the extremities. Other material alterations in the cord, such as congestion or inflammation, could produce the same symptoms.

In his final chapter the author demonstrates the secondary rôle of cold in the production of local asphyxia. He recalls also the fact that Raynaud had observed a case caused by insolation. This fact established a relation with the febrile attacks following sunstroke. Cold and heat have, therefore, the same action in the pathogeny of attacks of local asphyxia and intermittent fever. In a therapeutic point of view, sulphate of quinine, the constant descending current to the spine, and derivative agents acting on that organ, are the medical agencies that have been found effective.

GASTRIC EPILEPSY.—H. Pommay, *Revue de Méd.*, 1, vi, June 10, describes and discusses a couple of cases of epilepsy, apparently connected with digestive disorders, and ends his article with the following conclusions :

1. Digestive disorders may give rise to various nervous symptoms ; due (*a*) to the paralysis, and (*b*) to the excitation of the vagus nerve.

2. These phenomena are of reflex origin, and occur entirely in the sphere of the vagus (irritation of its sensory gastric fibres, excitation or reflex paralysis of its cardiac branches).

3. The phenomena of excitation betray themselves in epileptic attacks, those of paralysis in cardiac crises (palpitation of the heart and defects of rhythm).

4. The age and the habitual condition of health of the subject appear to play a part in affecting the mode of the response to the irritation.

5. Gastric epilepsy differs from other epilepsies by (*a*) its cause—errors in diet,—and in (*b*) its symptoms—vomiting of food, in addition to the usual symptoms of the attack,—and in (*c*) its sequels—gastric embarrassments.

DÉLIRE AIGU.—Dr. Marcel Briaud, *Thèse de Paris*, 1881 (an.

by H. de Boyer in *Archives de Neurologie*, July), considers the *délire aigu* to be a morbid entity, susceptible of precise definition. He describes, in its pathological anatomy, a lesion that he claims is almost constant, though it has not before been noticed. It consists of an injection, of variable extent, of the internal tunic of the arch of the aorta, resembling very much the effect that "would be produced by a brush, two or three centimetres thick, charged with red ink, carried from below upward for five or six centimetres from the sigmoid valves." This very marked coloration, which is sometimes accompanied with actual thickening, is strictly limited to the internal tunic of the vessel, and is independent of the atheromatous patches that may exist there, and which it sometimes envelopes. It is met with in subjects of all ages, temperate or otherwise. It is sometimes more than a simple injection; in some cases there is a genuine false membrane investing the inner wall of the aorta. According to the author this is only a more advanced stage of the pathological process. The existence of this lesion supports the view that the cause of the gravity of the disorder is to be sought for in a modification of the blood. The typhoid aspect of the patients also favors this view.

Hereditary predisposition and excesses are the causes that predominate in the etiology of the disorder, together with faulty hygienic conditions.

The cases given in illustration support the author's statements very fully. Among them is that of a well-known musical composer. Though death is the usual termination, cure may occur, and in these cases the author attributes the favorable result mainly to the disuse of all mechanical restraint and all causes of contention. He also mentions good results from the use of salicylate of soda, and tonics, and the wet pack, in the treatment of this disorder.

GLYCOSURIA FROM STRETCHING THE VAGI.—At the session of the Soc. de Biologie, May 14 (rep. in *Le Progrès Médical*, No. 21), MM. Marcus and Wiet announced that in carrying on their researches on nerve-stretching, they had made some experiments to find out what results followed the elongation of the pneumogastri-
cs.

In the first rabbit experimented upon they operated by stretching the right pneumogastric on its central portion. The animal, who could not be examined, died three days after the operation. The autopsy presented all the signs of asphyxia. Its lungs were

covered with ecchymoses, and the bronchiæ filled with foamy sputa.

A second rabbit, carefully chosen and pure white in color, was experimented upon; on this animal MM. Marcus and Wiet stretched both pneumogastrics, operating on the central end and carefully avoiding any implication of the sympathetics. Immediately after the operation they observed a considerable congestion of the two ears, which was followed, a few minutes later, by a not less-marked contraction of the vessels. This anæmia was of short duration, and gave place to an intense vaso-dilatation that existed up to the time of making their report, and a very well-marked double myosis. The next day the animal commenced to have difficulty in breathing, and this symptom became still more prominent and led to the presumption that the rabbit would ultimately die asphyxiated. The analysis of the urine showed nothing abnormal the first day after the operation, but on the second day it revealed the presence of traces of sugar, well shown by Fehling's test and that of the subnitrate of bismuth.

The authors also stretched the two vagi in another rabbit to ascertain whether the operation would not produce glycosuria. This, indeed, was the fact, as the experimenters easily demonstrated with the aid of the above-mentioned reagents.

These facts appear to show that stretching of the nerves produces an effect on the nerve centres, and they may throw some light on several physiological questions now the order of the day. The histological study of the medullas of the animals experimented upon will aid to complete the investigation, and may also be of some use in the solution of these problems.

MM. Marcus and Wiet also stretched the sympathetic and the vagus by pulling the peripheral portion, and their researches will form the subject of a future communication.

CALCAREOUS DEPOSITS IN THE SPINAL ARACHNOID.—Chvostek, *Wiener Med. Presse*, Nos. 51 and 52, 1880, and 13 and 15, 1881 (abstr. in *Centralbl. f. d. Med. Wissensch.*, No. 27), reports a series of cases in which, with the clinical symptoms of a spinal affection,—severe neuralgic pains, increased by attempts at movement of the rigidly held lumbar and dorsal vertebræ, the ascending extension of the process from the lumbar to the dorsal spine, the late and insignificant involvement of the motor nerves, the advanced age of the patients, the long duration of the process, and,

prominently, the lack of symptoms that are characteristic of other spinal diseases, being the principal points for the diagnosis,—the autopsy revealed numerous and very large calcareous plates in the spinal arachnoid, which apparently bore a causal relation to the above symptoms.

THE COINCIDENCE OF SPINAL DISEASE AND SKIN AFFECTIONS.

—A. Jarisch, *Vierteljahrschr. f. Dermatol. u. Syphilis*, 1880, p. 195, (abst. in *Centralbl. für Med. Wissensch.*, No. 27, 1881). Starting with the presumption that the advances in nerve pathology would also assist in the explanation of the connection between skin diseases and disorders of the nervous system, the author undertook the microscopic examination of the spinal cord of a patient who, without developing motor or sensory disturbances, had suffered from an intense, in part sharply limited, febrile herpes iris, and, after the occurrence of an acute bed sore over the sacrum and fatal inflammation of the lungs, had afforded, as obvious results of the autopsy, a lobular pneumonia associated with the third stage of Bright's disease.

Examination of the cord hardened in a $\frac{1}{10}$ th per cent. solution of chromic acid, revealed notable alterations in its gray axis. The central and posterior portions of both anterior horns appeared in part to be spongy and in part shrunken, and in the region of the 3-7 and 2-5 cervical nerves there were symmetrical lateral foci of alteration. The majority of the ganglion cells in the anterior horns, from the third cervical to the eighth dorsal vertebra, had become coarsely granular, and their processes were notably thickened; also there had been formed in the foci a network of thick, smooth-margined fibres made up of irregularly formed pieces.

These alterations existed in their greatest intensity in those parts in which Charcot has located his hypothetical trophic centres for the skin.

The author also extended his investigations into the spinal cord in syphilis, and found in three cases of inherited syphilis circumscribed foci in the central portion of the anterior horns or in the commissure, which were deeply colored and showed visible swellings of the network. In two of these cases the protoplasm of the ganglion cells was coarsely granular; in the third it appeared shrunken and penetrated by numerous vacuoles. The medulla in a case of acquired syphilis was similarly pathologically altered.

Finally, Jarisch discovered in the spinal cord of a man who had been a sufferer from psoriasis for the greater part of his life,

sclerosed and inflamed patches in the gray axis, and in one case of lupus erythematosus, symmetrical patches, visible to the naked eye, in the central lateral portion of the anterior horns, the same locality as was affected in the already-mentioned case of herpes iris.

HYDROPHOBIA.—MM. Bertholle and Eloy send the account of a carefully observed and reported case of hydrophobia in the human subject in *L'Union Médicale*, Aug. 11, with the following conclusions :

1. The existence of hydrophobia in our patient is incontestable. The incubation of about forty days had a duration confirmable to the statistics resulting from the observations collected by the Conseil d'Hygiène of 1862-1874. Death occurred rapidly about forty-eight hours after the beginning of the hydrophobic spasms.

2. Erections, ejaculations, and dysuria were the first symptoms of irritation of the nervous centres. These early phenomena, in the absence of any other clinical indication, might lead to error, since they occurred at a period of the disease in which the existence of genetic disorders had not been noticed by authors. Here the excitation of the genito-urinary organs was the first manifestation of spinal irritation, preceding thus the other classic phenomena of hydrophobia.

3. The generalization of cadaveric rigidity, its prompt appearance, and the quickness with which putrefaction set in, are phenomena analogous to those observed in physiological experiments. They confirm the numerous observations made now many months in the laboratory of experimental medicine of the College de France, by which M. Brown-Séquard has shown that cadaveric rigidity and putrefaction appear the more quickly as the death was preceded by longer and more violent convulsions. These phenomena are therefore in relation, not with the hydrophobic intoxication, but with the duration of the convulsive spasms.

4. The dark coloration and the diminution of the fluidity of the blood are proofs that in this case death was not due to asphyxia. Indeed, in cases of asphyxia the blood is fluid and presents no increase in its consistency. Our observation therefore confirms the statement to that effect made by Dr. Calve, of Toulon (*Union Médicale*, Dec. 30, 1876).

The existence of pulmonary ecchymoses in hydrophobia is also in confirmation of a physiological phenomenon observed by vari-

ous authors and studied with care by Dr. Henocque (*Gaz. Hebdom.*, 1880, Nov., 1, 2, and 3). In cases of lesions of the nervous centres, these ecchymoses are met with in the tissues of various organs (stomach, intestines, bladder, liver, etc.); but they occur habitually in the pulmonary substance, as in the present case. The bloody appearance of the tracheal form is probably caused by the mingling of these extravasations with the bronchial mucus.

The pulmonary emphysema often observed in hydrophobia, probably occurs subsequent to death. It is produced by an analogous mechanism to that of the *post-mortem* emphysema studied some time ago by M. Henocque, especially in cases of violent death and lesions of the nerve centres.

The anatomical differences between the contraction of the right and left halves of the diaphragm are similar to those observed in animals following a nervous irritation on only one side of the body. It was precisely this result in certain previous physiological experiments, as yet unpublished, of which we were witnesses, that led one of us to seek for and ascertain these differences in the autopsy of our patient.

En résumé, the excitation of the cord, localized, in the beginning, in the centres of innervation of the genito-urinary organs, was the first act of this pathological drama. But, so far as we are aware, genesic disorders have never before been observed in the prodromic period of hydrophobia. They have been observed in an advanced stage of the disease. Such, for example, was the case in the patient of Van Swieten, whose death was preceded by ejaculations, and of whom he wrote "*Semen et animam simul efflavit.*"

The respiratory disorders, the pulmonary ecchymoses, the differences in the state of contracture of the two halves of the diaphragm, the condition of the blood, are signs of a death by syncope, rather than by asphyxia, and are related to the physiological phenomena observed in animals (guinea-pig, dog, rabbit, ape), following irritations at a distance or direct injuries of the medulla. These facts, moreover, appear to be related to the numerous successes obtained in Germany and in France by M. Pasteur in the inoculations practised on dogs with the tissue of the medulla itself taken from other rabid dogs. Therefore we wait with some impatience the result of experiments by M. Pasteur with inoculations with the bulbar tissue of our patient. This will, if successful, be an authentic case, if not the first one, of the direct

transmission of rabies from men to the lower animals, and a great step in the experimental study of hydrophobia.

INJURIES OF THE BRAIN, WITH GENERAL AND WITH LOCAL SYMPTOMS.—E. v. Bergmann, *Volkm. Klin. Vorträge*, No. 190, (abstr. in *Deutsche Med. Wochenschr.*, No. 35, Aug. 27). The author first, in this valuable clinical lecture, directs himself against the former sharp distinction of cerebral shock and cerebral compression. As he has repeatedly stated in former papers, the general symptoms observed in both of these traumatic conditions are referable to a more or less considerable disturbance of nutrition of the whole brain, which, according to the irritability of the various sections of the brain, reveals itself in paralytic or irritative phenomena. The cortex is earliest affected in all cases, the centres situated in the medulla (vaso-motor and vagus centres) are implicated later. Slight concussion causes only a transitory confusion resulting from shock to the nerve elements, or a vaso-motor disturbance of the surface of the brain; a more severe one has, as a consequence, more lasting benumbing of the faculties and retardation of the pulse, with irregularity of the respiration from a more pronounced paralysis of the cortex, and with it irritation of the automatic centres in the medulla. A still severer shock produces quickening, weakening, and smallness of the pulse, together with deep coma in consequence of paralysis of the central organs involved. A compression of the brain from extravasation of blood between it and the dura, when slight, may cause also only a moderate, transient benumbing of the faculties, but when more extensive, causes more lasting unconsciousness, with sopor and slow pulse, and later, coma with small, rapid pulse. The cortical paralysis which asserts itself variously from mere confusion to the most profound coma, is in the first case the result of nutritive disturbances in the nervous elements, accompanied later by vaso-motor disorder or capillary hemorrhages in the cortex; in the second case the coma is the result of anæmia caused by the increasing pressure having a great extension over the cortex, inhibiting and destroying the function of the nerve elements. The same cause affects the automatic organs, first causing irritation and then their paralysis. Any distinction between the phenomena of cerebral shock and cerebral compression is only afforded by the order in time and the duration of the symptoms. In cerebral shock the symptoms are of early occurrence, and, in favorable cases, early in

disappearing. In cerebral compression they increase slowly or rapidly but continuously, and they last longer in favorable cases, even if the extravasation is absorbed. If after injury to the skull the cerebral symptoms are steadily severer, the coma more profound, the respiration stertorous, and the pulse steadily retarded, then increasing pressure is to be diagnosed, caused by an extravasation, and trephining, for the stoppage of the bleeding, is needed. If after rather quick-appearing, transient, severe cerebral symptoms, there is left a dulness with confusion and drowsiness, while the pulse and respiration are normal, then the first symptoms are probably due to a cerebral shock accompanying the traumatic injury to the nervous substance, while the later confusion, etc., are due to an extravasation upon the surface of the brain not large enough to cause serious compression, but yet sufficient to disorder the functions of the sensitive brain. If a large extravasation becomes absorbed, the disturbances of the pulse and respiration disappear first, the mental confusion last. Von Bergmann found in these cases urobilin in the urine (a result of absorbed coloring matter of the blood). Stasis papilla is not necessarily present with an intracranial extravasation. It is often lacking, and may, moreover, occur (according to Berlin) with fracture of the basis cranii (without extravasation), as when the fissure crosses the optic canal and ruptures the nerve-sheath, blood from the former enters the latter. The brain injuries with local symptoms form a natural counterpart to those with general symptoms. They occur when preferably a more or less circumscribed portion of the brain is injured. In that case the special symptoms connected with the injured part are most prominent. But if at the same time the whole brain is also more or less involved, whether as a consequence of shock or through pressure from a rapidly increasing extravasation of blood, then they only will require consideration together with the general phenomena, whether the latter are slight or retrogressive. Localized brain symptoms occur especially prominent with lesions of the motor zone, and appear as definite combined paralytic and irritative phenomena on the opposite half of the body. From these symptoms the locality and extension of the injury in the motor zone can be definitely known, and the case treated accordingly. Broca has given directions for the orientation over the motor region on the skull, and these the author copies. Still another method is given by Lucas Champonniere. Still the author considers both methods, which are given in Lucas Champonniere's monograph on localized trepanation, as not al-

together satisfactory, and the last one is somewhat complicated. (A much simpler method, and one that has been verified by numerous experiments on the cadaver, will be published by the reviewer (M. Schüller) in the *Deutsche Med. Wochenschr.*) Von Bergmann reports one case in which he successfully trephined a funnel-formed depression of the right temporal bone of some 3-4 cm. circumference. He takes the occasion to recommend, after removal of fragments of bone and careful antiseptic cleansing of the wound, the utmost possible cleanliness of the skin-margin of the wound above the trephined place. The cutaneous wound is closed over the opening, through which a drainage tube is laid upon the brain. * * *

The author adds to this case instructive remarks upon the phenomena of cerebral œdema, which occurred in the vicinity of the wound, and with this connects the paralysis of the left arm that appeared some hours after the operation, disappearing again in a few days, to which were added now and then contractions in the muscles supplied by the left facial nerve. From these symptoms Bergmann thinks that the spot of the cortical injury must be sought for in the anterior margin of the anterior central gyrus, where it borders the third frontal.

MENTAL SYMPTOMS FROM ISTHMUS DISEASE.—The conventional notion associates all mental disturbances with perversion of the functions of the cerebral hemispheres. This it would be a truism to speak of as a correct belief, but sufficient stress is not laid by modern writers on the fact that the converse, pathologically speaking, of this proposition is not of universal application, namely, that only hemispheric lesions are found where mental symptoms have been evinced during life. It is an old observation, but it has not been sufficiently commented on, that lesions of the pons, the crura, and thalami, are accompanied by obliteration, more or less complete, of consciousness, blurring of the perceptions, confusion in the intellectual sphere, and this in cases where the lesion was not one of such a character as to disturb neighboring ganglia by pressure. Two explanations may be offered for this phenomenon. Either the vaso-motor centre for the cortical vessels must be assumed to be under the partial control of isthmus ganglia, and hence that isthmus lesions may by irritation or destruction of this centre excite or paralyze the vascular tubes of

certain cortical districts, or it must be concluded that the pathological interruption of the great nerve tracts involves a functional disturbance of cortical end stations. The former explanation would seem rather applicable to cases in which general and widespread mental disturbance, somnolence, excitement, or depression are found ; the latter, to those where the disturbances are partial in character.

It is a well-known fact that if all the avenues of sensory perception are closed, unconsciousness in the way of sleep speedily follows. May not the interruption of the perception tracts be followed by corresponding phenomena of a less extensive nature, when occurring in the isthmus territory? That an irritative lesion in the line of the centripetal tracts can influence cortical life, is amply illustrated by cases of thalamus lesion, where hallucinations were present. Here the cause of the hallucination is in a lower centre, but from all, the belief is justified that the entry of the hallucination into the intellectual sphere can only take place in the cortical termination of that tract. From this point, through the conducting associating tracts, it becomes a part and parcel of the patient's Ego. The study of the pathology of the great nerve tracts has been limited of late almost exclusively to the middle and posterior thirds of the internal capsule. It seems to have been forgotten that Meynert traced an enormous division of the crus directly to the frontal lobe and the lenticular nucleus, and that this portion, through the transverse fibres of the pons was of necessity connected with the cerebellum, and that other functions are to be located in the cortex, than merely muscular innervation and visual and auditory perceptions, to whose study modern localizationalists are directing their attention so exclusively. The restiform columns derived from spinal fibres enter the cerebellum, terminating chiefly in its hemispheres ; the cortex of the hemispheres is connected by radiatory fibres with the dentated nucleus, which is a recipient of fibres of the auditory nerve. In short, the cortex of the cerebellar hemisphere receives fibres from the sensorial periphery of the body as well as the semicircular canals, and possibly of the cochlea.

From the primary reception area, the transverse fibres of the pons originate, and enter the crus ; it is these which, according to Flechsig's most recent researches, enter the frontal lobe and lenticular nucleus. In no respect does man so much differ from the ape as in the quantitative development of this tract. It is intimately associated with the map of the frontal lobe. There is

every reason to consider it the channel of information of the equilibrium, and possibly of the senses of space and time, on which the scope of the mind is closely dependent. It is not at all improbable that lesions in these tracts may disturb these sensations, and that the entire mental architecture may totter with the withdrawal of so important pillars. Probably the congenital asymmetry of the peduncular tracts, observed in certain cases of mental perversion, may not be without a bearing in the explanation of the symptoms of those cases. And this explanation would be adjunct to the theory of mal-development of the associating tracts, recently advanced in explanation of other symptoms of these same states. The day will come when physiologists will not attempt any longer to determine the seat of higher functions in single centres by special experiments, but rather seek to correlate the results of different sets of experiments, and thus demonstrate that complex functions have a complex substratum. Nothing could be more absurd, for example, than to speak of "intellectual cells" (Denkzellen) in the cerebral cortex, as Schüle does in Ziemssen's Cyclopædia. Simple elements have simple functions, complex functions require a union of numerous simpler elements in a complex combination. (*Chicago Medical Review*, Sept. 20, 1881.)

AUTOGRAPHIC MEN.—Chouel (*Marseilles Médical*, January, 1881) reports a class of human beings whom he calls "autographic men," who, from certain central neuroses, present a form of urticaria which shows itself when a slight irritation is applied to the skin. The cuticle may be written on and retain the character inscribed on it for some time, through the urticaria so produced. Dujardin-Beaumetz was the first to describe this phenomenon, which is by no means rarely observed.—*Chicago Medical Review*, August 5, 1881.

ECLAMPSIA.—Masino (Lo Sperimentale) has arrived at certain conclusions which, while not entirely new, contain a fair *résumé* of existing knowledge on the subject. He claims, first, that the pathogeny of eclampsia is still obscure, but that clinical observation is in accord with experimental physiology in demonstrating that the seat of this disease is in the medulla oblongata. Second, that the nature of these unknown alterations, whether they are of a toxic character or the results of reflex irritation, has yet not been settled. Third, the existence of sugar in the urine of eclamptic

patients may indicate a bio-chemical change in the medulla oblongata, but has no pathogenic value. Fourth, there seems to be a relation between the existence of sugar and the eclamptic attacks, the glycosuria ceasing on their cessation. Fifth, the urine of eclamptics does not always contain albumen, nor is anasarca always present. Sixth, temperature has no essential relations with it. Seventh, the temperature, however, does not always remain the same; sometimes it rises a few hours before an eclamptic seizure, but generally returns to normal. Eighth, the continued existence of a high temperature indicates the existence of a complication of the eclampsia. From these conclusions, Massin draws the following indications for treatment. First, the two best indications for symptomatic treatment are to combat passive congestion and diminish nervous excitability. Second, the methods of procedure most capable of fulfilling these indications are, in the first case, blood-letting, in the second, chloroform and chloral hydrate. It might well be asked whether the blood-letting did not act on the nervous system directly.—*Chicago Medical Review*, July 5, 1881.

HYDROPHOBIA AND STRYCHNINE.—A case likely to lead to interesting medico-legal discussions recently occurred at Tipton, Indiana. A rabid dog bit an old woman and her daughter. They died two weeks after from what was regarded as hydrophobia. Suspicion being accidentally awakened, investigation led to the discovery that the son-in-law of the old woman, it is claimed, had poisoned her with strychnine. He evidently seized a fortunate period for the administration of the drug, and a skilful lawyer could easily throw much doubt on the forensic circumstantial evidence against the accused.—*Chic. Med. Rev.*, October 5, 1881.

REAL AND SIMULATED EPILEPSY.—Gottardi (*Giornale di Medicina Militare*) examines carefully the diagnostic points given by various authors, and comes to the following conclusions: Tactile sensibility, as determined by Weber's compass, immediately after the epileptic attack, is of no value as a means of diagnosis. Permanent alterations of the fundus of the eye are most frequent in cases presenting asymmetry of the face and skull, already recognized by Voisin, Müller, Dumas, and Hasse. During the attack, and better still after the attack, temporary alterations occur in the vascularization of the fundus of the eye, or, isolatedly, of the

central vessels of the retina. These alterations are, however, of no value as a means of diagnosis in cases of simulated epilepsy, as they occur under the influences of other causes. The temperature, Gottardi (in full accord with the results of Charcot, Bourneville, and Jaccoud) finds to be markedly lower after an attack, a conclusion with which other observers are very likely not to agree. The sphygmographic traces obtained by Gottardi corroborate those obtained by Voisin. In epileptics, after the attack, the mean pulse is, according to Gottardi, lower than normal, remaining for a time stationary, then rising to normal. He regards this as characteristic of the disease. It is obvious, however, that the simulation of epilepsy by a neurotic individual is a somewhat difficult matter to detect.—*Chicago Medical Review*, June 20th.

The following are the titles of some of the recent papers on the pathology of the nervous system and mind.

LEPINE, R.: Sur l'épilepsie congestive, *Revue de Médecine*, June. LANGHANS, T.: Ueber Höhlenbildung im Rückenmark als Folge von Blutstauung, *Virchow's Archiv*, lxxxv, i, 1880. ISRAEL, OSCAR: Schussverletzung der grossen Armennerven mit nachfolgender Atrophie der Extremität, *Ibid.* SEGUIN, E. C.: Clinical lecture on hemiplegic epilepsy, *Boston Med. and Surg. Journ.*, July 21st. WALTON, GEO. L.: The reflexes; notes from one of Professor Erb's lectures on the diagnosis of diseases of the nervous system, Leipzig, *Ibid.*, Aug. 4th. BECHTEREN, W.: Ueber die klinischen Erscheinungen des Symptoms von combinirter Abweichung der Augen und des Kopfes bei Affectionen der Gehirnrinde, *St. Petersb. Med. Wochenschr.*, Nos. 12 and 13; and der Einfluss der Hirnrinde auf die Körpertemperatur, *Ibid.*, No. 25. LIZE, D.: Sur quelques symptomes laryngobronchiques de l'ataxie locomoteur progressive, etc., *L'Union Méd.*, No. 100. BERTHOLLE and CH. ELOY: Observation d'hydrophobie rabique, *Ibid.*, No. 111. DE JONGE, D.: Ueber einen Fall von sogenanter Compressions myelitis mit hochgradiger Steigerung des Tastsinnes der gelähmten Unterextremitäten, *Deutsche Med. Wochenschr.*, No. 35. UNVERRICHT: Beitrag zur Lehre von partiellen Epilepsie, *Ibid.* BASSI, UGO: Contributo allo studio dei fenomeni postemiplegici; emiatassia postemiplegica, *Lo Sperimentale*, July. JOHNSON, ANNA H.: Neurasthenia, *Phila. Med. Times*, Aug. 27th. REICHERT, E. T.: Convulsions due to depression of spinal reflex-inhibitory centres, with special reference to the convulsions of

apomorphine, atropine, strychnine, and other poisons, *Ibid.*, Aug. 13th. SPAMER: Ueber den Hypnotismus, seine Ursachen, sein Wesen und die aus beiden sich ergehenden Folgerungen, *Fahrh. f. Psych.*, iii, Hft. i and ii. SEELIGMÜLLER: Ueber traumatischen Tremor und die Simulation desselben, *Ibid.* HÖLLÄNDER: Ueber epileptoide Zustände mit Einschluss des transitorischen Irrseins, *Ibid.* GREENE, J. S.: Subinvolution of the uterus and neurasthenia, *Boston Med. and Surg. Journ.*, Aug. 11th. SEGUIN, E. C.: Importance of the early recognition of epilepsy, *N. Y. Med. Record*, Aug. 6th and 11th.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

HOANG NAN.—Dr. Barthelemy (*Bulletin Générale de Thérapeutique Médicale et Chirurgicale*, August 15, 1881) claims that on man hoang nan produces the following effects: In a small dose, five to ten centigrammes, the result is an augmentation of the mental and physical activity, increased animation and flow of ideas. Given for a long time in this dose hoang nan has a tonic effect, increasing flesh and weight. In from two to four times the dose just mentioned, general feeling of heat, itching and formication result; muscular tonus and the reflexes are increased; there are also pains over the region of the liver, in both temples; and, at the same time, vertigo. From a still larger dose, general malaise, excessive vertigo, irregular involuntary contractions of the feet and hands result. An excessive dose is attended by loss of consciousness and chills.—*Chic. Med. Rev.*, Oct. 5, 1881.

MASSAGE FOR THE RELIEF OF TABETIC ANÆSTHESIA.—Schreiber (*Medicin, Chirurgische Rundschau*, April, 1881) claims very good results from massage in a case of locomotor ataxia in an advanced stage, with lancinating pains, gastric crises, paralysis of the abducens nerve, and complete anæsthesia of both gluteal regions. Having been convinced that massage is capable of curing the anæsthesia which presents itself in the course of neuralgia, especially in sciatic, Schreiber resolved to attempt this treatment in the case under consideration, although it has been heretofore claimed that mechanical treatment is contra-indicated in locomotor ataxia. In daily sittings of five minutes' duration, the affected parts were kneaded with the clenched fist in various

directions. The manipulations were performed with moderate force, and did not cause pain. After twelve days the anæsthesia, which had existed five months without any intermissions, disappeared entirely. Türk was the first to point out that rubbing was sufficient to relieve mild anæsthesia, and he asserted that the benefit derived from salves and liniments was in a great measure due to the conjoined mechanical manipulations. What the rationale of the treatment is cannot be said. A single case is, however, not of much value as evidence of the good result of any treatment in any disease whatever.—*Chicago Med. Review*, Oct. 5, 1881.

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Ueber Hemianopsie und Ihr Verhältniss zur Topischen Diagnose der Gehirnkrankheiten, von Dr. Hermann Wilbrand. Berlin, 1881. Pages 214.

Lehrbuch der Neurologie, von Dr. G. Schwalbe. Erlangen, 1881. Pages 1026.

Real-Encyclopädie der gesammten Heilkunde. Medicinisch-Chirurgisches Handwörterbuch für praktische Aerzte. Herausgegeben von Dr. Albert Eulenberg. Mit zahlreichen Illustrationen in Holzschnitt. Wien und Leipzig, 1881.

Dictionnaire Encyclopédique des Sciences Médicales. Directeur, A Dechambre. Paris, 1881.

A Treatise on Diseases of the Nervous System, by James Ross, M.D., 2 vols. Wm. Wood & Co., 1881, 594 and 998 pages.

A Treatise on Food and Dietetics, Physiologically and Therapeutically Considered, by T. W. Pavy, M.D., F.R.S. Second edition. Wm. Wood & Co., 1881, pages 402.

A System of Surgery, Theoretical and Practical, in Treatises by various Authors. Edited by T. Holmes, M.A., Cantab. First American from second English edition. Revised and enlarged by John H. Packard, A.M., M.D. Vol. I. H. C. Lea's Son & Co. Pages 1007.

Sull' Azione della Iosciamina e sul suo Valore Terapeutico nelle Malattie Mentali, dei Dottori Giuseppe Seppilli e Gaetano Riva. Reggio nell' Emilia, 1881.

Osservazioni sul Cranio e Cervello di un Idrocefalo di 19 Anni, del Prof. A. Tamburini. Reggio nell' Emilia, 1881.

Sulla Legislazione per gli Alienati ed i Maniaci del Prof. A. Tamburini. Milano, 1881.

Opening and Drainage of Cavities in the Lungs, by Christian Fenger, M.D., and J. H. Hollister, M.D., Chicago, Ill. (Extracted from the *American Journal of the Medical Sciences* for October, 1881.)

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Contributions to Psychiatry, by Jas. G. Kiernan, M.D. (Reprint from JOURNAL OF NERVOUS AND MENTAL DISEASE, April, 1881.)

Case of Paretic Dementia : Intercurrent Attack of Left-sided Convulsions, beginning in, and chiefly confined to, Arm and Face ; Lesions of Posterior Extremity of Right Superior Frontal Convolution, by Ringrose Atkins, M.A., M.D. (Reprint from Brain, Part xiii.)

Contributions to the Study of the Toxicology of Cardiac Depressants, by Edward T. Reichert, M.D. (Extract from the *American Journal of Medical Sciences*, October, 1881.)

Convulsions due to Depression of Spinal Reflex Inhibitory Centres ; with special Reference to the Convulsions of Apomorphine, Atrophine, Strychnine, and other Poisons, by Edward T. Reichert, M.D. (Reprint from *Philadelphia Medical Times*, August 13, 1881.)

The Dangers and the Duty of the Hour, by William Goodell, M.D. (Reprint from the *Transactions of the Medical and Surgical Society of Maryland*, 1881.)

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Simple Methods to Stanch Accidental Hemorrhage, by Edward Borck, M.D. (Reprint from *Indiana Medical Reporter*, April, 1881.)

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Atresia of the Vagina and Uterus, by A. F. Erich, M.D. (Reprint from the *Atlanta Medical Register*, Nov., 1881.)

Chronic Pelvic Abscess, by A. F. Erich, M.D.

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Annales Médico-Psychologiques.

Archives de Neurologie.

Archives de Physiologie Normale et Pathologique.

Archiv fuer Anatomie und Physiologie.

Archiv fuer die Gesammte Physiologie der Menschen und Thiere.

Archiv fuer Path. Anatomie, Physiologie, und fuer Klin. Medicin.

Archiv f. Psychiatrie u. Nervenkrankheiten.

Archivio Italiano per le Malattie Nervose.

Brain.

British Medical Journal.

Bulletin Générale de Thérapeutique.

Centralblatt f. d. Med. Wissenschaften.

Centralblatt f. d. Nervenheilk., Psychiatrie, etc.

Cronica Med. Quirurg. de la Habana.

Deutsche Medicinische Wochenschrift.

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Dublin Journal of Medical Science.

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Nordiskt Medicinskt Arkiv.
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 Rivista Clinica di Bologna.
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Nashville Journal of Medicine.
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New England Medical Monthly.
New Orleans Medical and Surgical Journal.
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New York Medical Journal.
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Pacific Medical and Surgical Journal.
Philadelphia Medical Times.
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Physician and Surgeon.
Proceedings of the Medical Society of the County of Kings.
Quarterly Epitome of Braithwaite's Retrospect.
Quarterly Journal of Inebriety.
Rocky Mountain Medical Review.
Sanitarian.
Science.
Southern Clinic.
Southern Practitioner.
Specialist and Intelligencer.
St. Joseph Medical and Surgical Reporter.
St. Louis Clinical Record.
St. Louis Courier of Medicine.
St. Louis Medical and Surgical Journal.
Therapeutic Gazette.
Toledo Medical and Surgical Journal.
Veterinary Gazette.
Virginia Medical Monthly.
Walsh's Retrospect.

THE JOURNAL OF Nervous and Mental Disease

EDITED BY

WILLIAM J. MORTON, M.D., NEW YORK.

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PROSPECTUS FOR 1882.

The JOURNAL OF NERVOUS AND MENTAL DISEASE, with the issue of January 1, 1882, will pass into the ninth year of its existence. It is therefore the longest-continued journal on Diseases of the Nervous System ever published in this country, and it is speaking within bounds to say that it has proved a constant credit to American medical literature. During its term of life it has won its way to the highest recognition as an authority and guide in that branch of medicine of which it is an exponent. To the specialist on Nervous Diseases it has ever been an inviting field in which to record his observations, and an unfailing source of information in his studies ; to the general practitioner it has proved the readiest means of keeping himself informed of the current thought of the times concerning a class of diseases that pass daily before his eyes and claim his acutest attention. To meet the wants of both these classes will still be its mission.

Diseases of the Nervous System form probably the most important part of the modern practitioner's labors. In no branch of medicine is it more difficult to keep abreast of the times ; in no branch are more noteworthy discoveries being made. The JOURNAL offers, then, to the specialist a forum from which to address his labors to the medical world, either by original communications or through editorial abstract and comment ; while to the busy practitioner it presents a class of special information which cannot be obtained in the journals of general medicine. Conducted and edited by men who are engaged in special practice, there will be nothing in its pages which the general practitioner will not find of service to him in his every-day duties, and in this respect it will be found to differ from special journals in many other departments of medicine.

The January number of the JOURNAL will go forth to its subscribers and friends under a new management. It has become the exclusive property of the present editor, who has happily been able to secure the continued aid of those who have contributed to its previous success, and to add to their number distinguished associate editors and an efficient corps of collaborators whose names and reputations are well and favorably known to the profession and to the world.

The former editor, who was also the proprietor of the journal which he had himself established, found that increasing professional cares and impaired health would no longer permit him to give the labor and attention required for the editorial work, and he has therefore transferred the JOURNAL to the present management. While the JOURNAL will no longer have the benefit of Dr. Jewell's editorial control, the editor takes pleasure in announcing that he has received every assurance of his continued hearty interest and the promise of his valuable aid as an associate editor. The editor is also glad to be able to announce that Doctors W. A. Hammond and Meredith Clymer, of New York, and Doctor H. M. Bannister, of Chicago, who have heretofore acted as associate editors, have agreed to continue their active co-operation in the same capacity. To this already efficient editorial staff are now added the names of Drs. E. C. Seguin and Isaac Ott. Having in view the co-operation of the gentlemen named and that of the staff of collaborators soon to be announced, the editor feels a just pride in the prospects of the JOURNAL OF NERVOUS AND MENTAL DISEASE, and may reasonably hope that it will continue to maintain the position which it has long held before the medical profession, and may continue to be accepted as the exponent of thorough and capable work in the branch of diseases of which it treats.

On account of inability to give adequate attention to the work, Dr. S. Weir Mitchell no longer continues as associate editor. He writes: "I may hope, however, although not as editor, to aid your purposes."

The JOURNAL will be both edited and published in New York. The distinctive features of its general make-up will not be altered. Original contributions of value are already secured for its pages. Careful attention will be given to critical reviews of current literature, both domestic and foreign, and every effort will be made to maintain, at its present high state of excellence, the Periscope or Abstract Department.

It is hardly necessary to say that the JOURNAL represents no clique, school, nor party. It will be in the widest sense independent and cosmopolitan. We cordially invite communications from all interested in Neurological Science, and we can promise an absolutely impartial consideration to all.

Conscious of our obligations to our subscribers and to the medical public, we shall make every practicable endeavor to widen the range of usefulness of a journal whose value has already been tested.

Contributions, books for review, exchanges, and communications pertaining to the Editorial Department should be addressed to Dr. WILLIAM J. MORTON, 15 East 45th Street, New York.

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